2H
96-97

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

REGISTER

OF

340

THE LEHIGH UNIVERSITY,

1896-1897.

SOUTH BETHLEHEM, PA.

1897.

Learning and Labor.
LIBRARY
OF THE
University of Illinois.
CLASS. BOOK. VOLUME.
C L52H 1896-99
Accession No.

REGISTER

OF

THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PA.

1896-1897.

FOUNDED BY ASA PACKER.

BETHLEHEM, PA.:
TIMES PUBLISHING COMPANY.
1897.

LIBRARY
UNIVERSITY OF ILLINOIS
URBANA
340
SB

TABULAR ALMANAC.

1896.

JULY.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	...	...	...
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	..	...	...	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

1897.

JANUARY.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	..	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	...	...	...	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	...
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	...	...	...
...	...	...	...	...	...	...

JULY.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	...	...	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

1898.

JANUARY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	...	...	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

CALENDAR.

1896.	1896-1897.
Sept. 19, 21, 22, .	Examinations for Admission.
Sept. 23, . . .	First Term begins.
Oct. 8, . . .	Founder's Day.
Nov. 26, . . .	Thanksgiving Day.
Dec. 23, . . .	Christmas Holidays begin.
1897.	
Jan. 4, 8¼ A.M., . .	Christmas Holidays end.
Jan. 16, . . .	Junior Prize Orations due.
Jan. 29, . . .	First Term ends.
Feb. 1, 2, 3, . .	Examinations for Admission to Second Term.
Feb. 4, 8¼ A.M., . .	Second Term begins.
Feb. 22, . . .	Washington's Birthday.
March 10, . . .	Ash Wednesday.
April 14, . . .	Easter Holidays begin.
April 21, . . .	Easter Holidays end.
May 22, . . .	University Day Orations due.
May 26, . . .	Senior Examinations begin.
June 7, . . .	Annual Examinations begin.
June 9, . . .	Graduation Theses due.
June 13, . . .	Baccalaureate Sunday.
June 14, . . .	Class Day.
June 15, . . .	Alumni Day.
June 16, . . .	University Day.
June 17, 18, 19, .	Examinations for Admission.

1897.	1897-1898.
Sept. 18, 20, 21, . .	Examinations for Admission.
Sept. 22, . . .	First Term begins.
Oct. 14, . . .	Founder's Day.
Dec. 22, . . .	Christmas Holidays begin.
1898.	
Jan. 3, 8¼ A.M., . .	Christmas Holidays end.
Jan. 31, Feb. 1, 2, .	Examinations for Admission to Second Term.
Feb. 3, . . .	Second Term begins.
June 15, . . .	University Day.

63596

BOARD OF TRUSTEES.

The Rt. Rev. N. Somerville Rulison, D.D.,	South Bethlehem.
Robert H. Sayre, ...	South Bethlehem.
William H. Sayre, ...	South Bethlehem.
Elisha P. Wilbur, ...	South Bethlehem.
James I. Blakslee, . . .	Mauch Chunk.
Charles Hartshorne, . . .	Philadelphia.
Henry S. Drinker, ...	Philadelphia.
Robert P. Linderman, . . .	South Bethlehem.

(Two vacancies.)

HONORARY TRUSTEES.

The Rt. Rev. Leighton Coleman, S.T.D.,	Wilmington, Del.
Charles Brodhead, ...	Bethlehem.
W. L. Conyngham, ...	Wilkes-Barre.
Charles O. Skeer, ...	Mauch Chunk.
The Rev. Marcus A. Tolman, . .	Mauch Chunk.
The Hon. Henry Green, . . .	Easton.

HONORARY ALUMNI TRUSTEES.

	TERM EXPIRES	
W. H. Baker, A.C., M.D., Class of 1873,	1897,	Philadelphia.
Thomas M. Eynon, M.E., Class of 1881,	1898,	Philadelphia.
Henry R. Price, C.E., M.D., Class of 1870,	1899,	Brooklyn, N.Y.
W. Arthur Lathrop, C.E., Class of 1875,	1900,	Wilkes-Barre.

OFFICERS OF THE BOARD.

President,
The Rt. Rev. Nelson Somerville Rulison, D.D.

Secretary,
Elisha P. Wilbur.

Treasurer of the University,
Elisha P. Wilbur.

EXECUTIVE COMMITTEE.

Robert H. Sayre, *Chairman,*
The President of the Board of Trustees,
Elisha P. Wilbur, Henry S. Drinker,
James I. Blakslee, William H. Sayre.
R. Morris Gummere, *Secretary.*

LIBRARY COMMITTEE.

The Director of the Library, *Chairman*,
The President of the Board of Trustees,
The President of the University,
Elisha P. Wilbur, Robert P. Linderman.

COMMITTEE ON BUILDINGS AND GROUNDS.

Elisha P. Wilbur, *Chairman*,
Robert H. Sayre, William H. Sayre.

COMMITTEE ON COLLEGE ADMINISTRATION.

Henry S. Drinker, *Chairman*,
William H. Sayre, Robert P. Linderman.

FACULTY.

THOMAS MESSINGER DROWN, LL.D.,
President of the University.
University Park, South Bethlehem.

WILLIAM H. CHANDLER, PH.D., F.C.S.,
Professor of Chemistry.
251 Cherokee Street, South Bethlehem.

BENJAMIN W. FRAZIER, A.M.,
Professor of Mineralogy and Metallurgy.
University Park, South Bethlehem.

H. WILSON HARDING, A.M.,
Professor of Physics and Electrical Engineering.
745 Delaware Avenue, South Bethlehem.

MANSFIELD MERRIMAN, C.E., PH.D.,
Professor of Civil Engineering.
University Park, South Bethlehem.

SEVERIN RINGER, U.J.D.,
Professor of Modern Languages and Literatures, and of History.
424 New Street, South Bethlehem.

EDWARD H. WILLIAMS, JR., B.A., E.M., A.C., F.G.S.A.,
Professor of Mining Engineering and Geology.
117 Church Street, Bethlehem.

JOSEPH F. KLEIN, D.E.,
Professor of Mechanical Engineering.
357 Market Street, Bethlehem.

WILLIAM ANDREW ROBINSON, M.A.,
Professor of the Greek Language and Literature, and Secretary of the Faculty.
St. Luke's Place, South Bethlehem.

EDMUND MORRIS HYDE, M.A., PH.D., L.H.D.,
Professor of the Latin Language and Literature.
326 Wyandotte Street, South Bethlehem.

Professor of Mental and Moral Philosophy.

CHARLES L. THORNBURG, C.E., PH.D.,
Professor of Mathematics and Astronomy.
Packer Avenue, South Bethlehem.

WILLIAM C. THAYER, M.A.,
Professor of the English Language and Literature.
59 Market Street, Bethlehem.

LECTURERS.

ALEXANDER MACFARLANE, M.A., D.SC., LL.D.,
In charge of the Department of Electrical Engineering.
St. Luke's Place, South Bethlehem.

WILLIAM L. ESTES, M.D.,
Lecturer on Physiology and Hygiene.
St. Luke's Hospital, South Bethlehem.

INSTRUCTORS AND ASSISTANTS.

ARTHUR E. MEAKER, C.E.,
Instructor in Mathematics.
514 Cherokee Street, South Bethlehem.

PRESTON A. LAMBERT, M.A.,
Instructor in Mathematics.
215 S. Centre Street, Bethlehem.

JOSEPH W. RICHARDS, M.A., A.C., M.S., PH.D.,
Instructor in Metallurgy, Mineralogy, and Blowpiping.
203 Church Street, Bethlehem.

LEWIS BUCKLEY SEMPLE, M.A., PH.D.,
Instructor in English.
17 North Street, Bethlehem.

RALPH M. WILCOX, PH.B.,
Instructor in Civil Engineering.
28 South Maple Street, Bethlehem.

JOHN P. BROOKS, M.S.,
Instructor in Civil Engineering.
201 West Broad Street, Bethlehem.

ROBERT FERGUSON, A.B.,
Instructor in Modern Languages.
603 Pawnee Street, South Bethlehem.

FREDERIC C. BIGGIN, B.S.,
Instructor in Drawing and Architecture.
West Broad Street, Bethlehem.

FREDERICK W. SPANUTIUS, M.S.,
Instructor in Qualitative Analysis, Assaying, and Industrial Chemistry.
315 Church Street, Bethlehem.

WILLIAM B. SHOBER, PH.D.,
Instructor in Organic Chemistry and Chemical Philosophy.
464 New Street, South Bethlehem.

HERMAN EUGENE KIEFER, A.C., M.S.,
Instructor in Geology and Lithology.
16 West Fourth Street, South Bethlehem.

JOSEPH BARRELL, B.S., E.M.,
Instructor in Mining and Metallurgy.
16 West Fourth Street, South Bethlehem.

ROBERT C. H. HECK, M.E.,
Instructor in Mechanical Engineering.
Cherokee Street, South Bethlehem.

J. GRANT CRAMER, A.M.,
Instructor in Modern Languages.
603 Pawnee Street, South Bethlehem.

HARRY M. ULLMANN, A.B., Ph.D.,
Instructor in Quantitative Analysis.
148 South Main Street, Bethlehem.

J. HENRY KLINCK, M.E.,
Instructor in Electrical Engineering.
440 Cherokee Street, South Bethlehem.

HENRY STORRS WEBB, B.S.,
Instructor in Electrical Engineering.
411 Cherokee Street, South Bethlehem.

JOHN HUTCHESON OGBURN, C.E.,
Instructor in Mathematics and Astronomy.
317 W. Packer Avenue, South Bethlehem.

BARRY HOLME JONES, B.S., E.M.,
Instructor in Mechanical Engineering,
Sun Inn, Bethlehem.

LEOPOLD OLIVIER DANSE, M.E.,
Instructor in Mechanical Engineering,
250 Wall Street, Bethlehem.

SCHUYLER S. CLARK, S.B.,
Instructor in Physics.
505 West Fourth Street, South Bethlehem.

ROBERT B. WILLIAMSON, M.E.,
Instructor in Electrical Engineering.
505 West Fourth Street, South Bethlehem.

WILLIAM H. HOFFMAN, B.C.E.,
Assistant in Civil Engineering.
Absent on leave.

NATT M. EMERY, B.A.,
Assistant in English.
American House, Bethlehem.

THE PACKER MEMORIAL CHURCH.

Chaplain,

Organist,
J. FRED WOLLE.
148 Church Street, Bethlehem.

GYMNASIUM.

Instructor,
C. W. SMITH.

LIBRARY.

Director,
WILLIAM H. CHANDLER, PH.D.

Chief Cataloguer,
A. W. STERNER.

Cataloguing Clerk,
WILSON F. STAUFFER.

Shelf Clerk,
PETER F. STAUFFER.

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer, of Mauch Chunk, during the year 1865, appropriated the sum of $500,000, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. On this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete education, technical, literary, and scientific, for those professions represented in the development of the peculiar resources of the surrounding region. In furtherance of this purpose instruction is liberally provided in Civil, Mechanical, Mining, and Electrical Engineering, Chemistry, Metallurgy, Architecture, and in all needful collateral studies. A School of General Literature is also established and thoroughly equipped, and includes the Classical course, the Latin-Scientific course, and the course in Science and Letters.

TUITION.

The following charges are made for tuition :

For students in the Technical courses, $100 per annum: $60 for the first term, $40 for the second term ; for stu-

dents in the school of General Literature, $60 per annum: $40 for the first term, $20 for the second term.

These fees include all tuition, with the use of the Library and Gymnasium, but the student is charged for materials and apparatus consumed in the Laboratories.

The Trustees have placed at the disposal of the Faculty a limited number of scholarships, to be awarded to applicants of good moral character who shall pass the entrance examinations creditably, and who for other cause shall be regarded as worthy by the Faculty.

Through the kindness of friends of the University, provision has been made for the awarding of a limited number of free scholarships to students taking the Classical Course who in other respects fulfil the above conditions.

Applications for these free scholarships should be made to the President of the University, who will furnish all needed information concerning the regulations which govern their bestowal.

All fees for tuition are payable to the Treasurer of the University in two instalments, as above. The first instalment is to be paid to the treasurer of the University on or before October 10; the second on or before January 20.

Students who fail to pay tuition fees when due will be notified by the President that their attendance at college exercises must be discontinued until payment is made.

Every candidate for a degree is required to pay a graduation fee of $10, before the degree is conferred.

PUBLIC WORSHIP.

Prayers are held in the Packer Memorial Church of the University every morning, the attendance being voluntary.

Divine service is held every Sunday morning in the church. Any student who may desire to attend some other place of worship will be permitted to do so upon the request of his parent or guardian or, if he be 21 years of age, upon his own request. The request for such per-

mission should be renewed at the beginning of each term. Attendance, either at the Packer Memorial Church or at the church of his selection, is required of every student.

SITE.

The situation of the institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

South Bethlehem is situated at the junction of the Lehigh Valley, the New Jersey Central, and the Reading (North Pennsylvania) Railroads, and the University buildings are about a half-mile from the station. New York is ninety-two and Philadelphia fifty-eight miles distant.

BUILDINGS.

PACKER HALL,

named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the South Mountain. It is built of stone, and contains the lecture and recitation rooms of the departments of Philosophy, Greek, Latin, Modern Languages, English, History, and Mathematics; the lecture, recitation, and drawing rooms, and the collections of the departments of Civil, Mechanical, and Mining Engineering, and the museum of geology and natural history.

THE CHEMICAL LABORATORY

is thoroughly fire-proof, is built of sandstone, and is 219 feet in length by 44 in width.

There are two principal stories and a basement. The upper floor is occupied by the quantitative and the qualitative chemical laboratories, the former accommodating 48 and the latter 84 students. These rooms are 22 feet in height, and are well lighted and ventilated. A laboratory for industrial chemistry and the supply room are also on this floor.

The first floor contains a large lecture room, a recitation room, a chemical museum, and laboratories for organic, physiological, agricultural, and sanitary chemistry.

In the basement is the large laboratory for the furnace assay of ores and a well appointed laboratory for gas analysis, also rooms containing the apparatus for several processes in industrial chemistry, the engine and air-pump for vacuum filtration, a store room, and the toilet.

A photographic laboratory is located in the third story of the central portion of the building.

THE METALLURGICAL LABORATORY

contains a lecture room, a blowpipe laboratory for class instruction in blowpipe analysis and in the practical determination of crystals and minerals, a museum for mineralogical and metallurgical collections, a mineralogical laboratory provided with a Fuess reflecting goniometer, a polariscope, a Groth's "universal apparat," and a Rosenbusch polarizing microscope, a dry laboratory provided with furnaces for solid fuel and for gas with natural draught and with blast, and a wet laboratory for ordinary analytical work. It is arranged for the instruction of classes in the courses of mineralogy, metallurgy, and blowpipe analysis of the regular curriculum, and to afford facilities to a limited number of advanced students for familiarizing themselves with the methods of measurement and research employed in mineralogy and metallurgy, and for conducting original investigations in these departments of science.

THE PHYSICAL LABORATORY.

The Physical Laboratory, erected in 1893, is a stone building 235 feet long, mostly 44 feet wide, and four stories in height. The general plan of the floors is to devote each wing to a large room, while the central part provides offices and store rooms, and the extreme ends provide auxiliary rooms and stairways.

FIRST FLOOR.—In the west wing is the dynamo laboratory, comprising dynamo room, battery room, workshop,

calculating room, etc. The dynamo room is 70 feet long and 20 feet wide. A 50 horse-power Straight-line steam-engine drives a line shaft, to which the several dynamos are connected by belting and friction clutches. The electrical plant consists of two Westinghouse rotary transformers, two Edison dynamos, one Thomson-Houston arc dynamo, one Richter arc dynamo, one Wenstrom incandescent dynamo, one Westinghouse alternator, two Tesla induction motors, several small motors, ten alternating current transformers, etc. The laboratory is well equipped with ammeters, voltmeters, wattmeters, and other measuring instruments. In the battery room an 80-cell chloride accumulator supplies current for testing purposes when the engine is not working. In the east wing is the thesis laboratory, consisting of eight small rooms, each of which is furnished with three stone tables resting on foundation piers. One of these rooms is specially fitted up for arc-light photometry.

SECOND FLOOR.—In the west wing is the designing room, 56 feet long by 44 feet wide, and adjacent to it is a small room which has been fitted up for blueprinting. In the east wing is the electrical laboratory, 60 feet long by 44 feet wide. It has been furnished and equipped for the several kinds of electrical measurement. A small room adjoining has been fitted up for the measurement of the magnetic qualities of iron. In the central part is the departmental library and reading-room; on the table will be found the current numbers of the principal electrical journals.

THIRD FLOOR. The principal apartments are the Lecture Hall in the west wing, and the Lecture Room in the east wing. The former is used for examinations, University lectures, and the meetings of several of the Engineering Societies; the latter is equipped with all the appliances for experimental lectures on physics and electricity.

FOURTH FLOOR. The west wing contains two recitation rooms, and the laboratory of general physics; while the east wing contains the light laboratory. The latter, in

addition to desk accommodation for forty students, contains twelve dark rooms fitted up for photometry and photography.

THE SAYRE OBSERVATORY.

Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument, and astronomical clock.

THE PACKER MEMORIAL CHURCH

is the munificent gift of Mrs. Mary Packer Cummings, daughter of the Founder of the University. It is one of the largest and most magnificent Churches in the State, richly furnished and handsomely appointed in every particular.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall is the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter.

THE GYMNASIUM

is a handsome and spacious structure, built and equipped with the utmost thoroughness. It is furnished with the best patterns of gymnastic apparatus, besides Dr. Sargent's system of developing appliances It is provided with hot and cold water; tub, sponge, and shower baths, and 389 clothes closets. Opportunities for recreation and amusement are provided in the bowling alleys. It is under the immediate care of a skilled and competent Director.

All students are required to undergo a physical examination before being allowed the use of the Gymnasium, and this examination will be repeated once each year during their stay at the University. The proper exercise is prescribed and is required of every student. These regulations are designed to promote the harmonious, symmetrical development of the individual student.

EXPENSES.

Books, materials, paper, pencils, materials used in the chemical laboratories, and drawing instruments are furnished by the student. Materials consumed in the chemical laboratories can be obtained from the University, their value being covered by a deposit made at the opening of that term in which the laboratory work is to be done.

Rooms and board cannot be had in University buildings, but can readily be obtained in many private houses.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included :

Tuition, ...	$100	$100
Board for 40 weeks, . . . from	160 to	200
Room-rent, with fuel and lights .	40 "	80
Care of room and use of furniture, .	5 "	20
Washing and incidentals, . . .	20 "	40
Books, stationery, etc., . . .	25 "	50
Total, ...	$350 to	$490

(In the case of students in the School of General Literature, the charge for Tuition is $60, and the totals are $310 to $450.)

NOTE.—If clubs be formed the cost of board need not exceed $3.50 per week.

ADMISSION OF STUDENTS.

The Register is intended to give all necessary information concerning the admission of students. Application may be made to the President of the University if information is desired which is not given in the Register.

DATE OF EXAMINATIONS.

Examinations for admission to the University are held at the opening of each term, and also in June at the close of the academic year.

The examinations for 1897 will be on Monday, Tuesday, and Wednesday, February 1, 2, and 3, for admission to the second term; on Thursday, Friday, and Saturday, June 17, 18, and 19, and on Saturday, Monday, and Tuesday, September 18, 20, and 21, for admission to the first term. No other examinations for admission will be held, except for good cause, and all applicants *must* be in attendance at 8.30 o'clock on the morning of the first day.

The examinations are held in June and September in the following order:

First Day.—English, 8.30 A.M.; Physics, 2 P.M.; Latin and Roman History, 2 P.M.

Second Day.—Geometry, 8.30 A.M.; Physical Geography, 11.30 A.M.; Geography, 3 P.M.; United States History, 4 P.M.

Third Day.—Algebra, 8.30 A.M.; Greek and Greek History, 2 P.M.

The schedules of examinations for applicants for admission to the Freshman Class at the beginning of the second term and to the Sophomore Class at the beginning of the first term may be obtained from the Secretary of the Faculty. Examinations at other than the appointed times can not be

granted without great inconvenience, and candidates so applying will be required to pay a fee of $5 into the Faculty's fund for the aid of indigent students.

CHARACTER OF THE EXAMINATIONS.

The examinations are rigorous and cover the entire ground laid down in the following scheme. They are all conducted in writing, supplemented by an oral examination at the option of the examiner.

Each candidate for admission must be at least sixteen years of age, and must present a testimonial of good moral character from his last instructor, or from the school or institute to which he last belonged, or from some reputable citizen of the community in which he lives.

Candidates for admission to

THE CLASSICAL COURSE

are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing,—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books prescribed for admission to the New England colleges. These are, for 1897: Shakespeare's As You Like It; Defoe's Journal of the Plague Year in London; Irving's Tales of a Traveller; Hawthorne's

Twice Told Tales; Longfellow's Evangeline; George Eliot's Silas Marner. The student is also urged to the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

2. *Geography*, general and political.

In 1898, and thereafter, Geography will not be required of candidates for admission to any course.

3. *History of the United States*, including the *Constitution*.

[Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement.]

4. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

5. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures.

In 1898, and thereafter, the whole of Plane Geometry will be required for admission to the Classical Course.

6. *Physical Geography.*

7. *Latin Grammar.*

8. *Cæsar*, four books of the Gallic war.

9. *Cicero*, six orations, including the four against Catiline.

10. *Vergil*, the first six books of the Æneid, including Prosody.

11. The translation, at sight, of passages from Cæsar and Cicero.

12. The translation of English into Latin. (As special importance is given this part of the examination, it is

suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

13. *Roman History.*—Creighton, Pennell, or Myers.

14. *Greek Grammar.*

15. *Xenophon*, Anabasis, four books.

16. *Homer*, Iliad, first three books, including Prosody. The Catalogue of Ships may be omitted.

17. The translation, at sight, of a passage from some work of Xenophon.

18. *Greek History.*—Fyffe, Pennell, or Myers.

The pronunciation of Greek according to the written accents is followed in the University, and it is desirable that students preparing to enter be taught this system.

Latin is pronounced according to the method generally known as the Roman Method.

Candidates for admission to the Classical Course who have had, in their preparatory schools, no opportunity of studying Greek, will be admitted to that course in full standing upon presenting an amount of French or German equivalent to two years' work. They will begin Greek in the University and study it throughout the course, and will then receive the degree of B.A.

THE LATIN-SCIENTIFIC COURSE.

Candidates for admission to this course must present the first thirteen of the above requirements, but substitute for the Greek sections (numbers 14–18 inclusive) the following:

19. *Geometry.*—Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles: these constituting the subject matter of Books Five and Six of Chauvenet's Geometry.

THE COURSE IN SCIENCE AND LETTERS.

Candidates for admission to this course are examined in all the subjects demanded of those entering the Latin-

Scientific Course, except the Latin and Physical Geography sections (numbers 6–13 inclusive). They also present the following:

20. *Elementary Physics.*

[Avery's Elements of Natural Philosophy (revised edition) is recommended; or Gage's Elements of Physics, if studied as intended by the author, with practical work in the laboratory by the student and the calculation of problems arising in the work.]

In 1898, and thereafter, one year's work in German or French will be added to the requirements for admission to the Latin-Scientific Course and to the Course in Science and Letters.

THE SCHOOL OF TECHNOLOGY.

Candidates for admission to the Courses in Civil Engineering, Mechanical Engineering, Mining Engineering, Electrical Engineering, Chemistry, and Architecture are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing,—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books prescribed for admission to the New England colleges. These are for 1897: Shakespeare's As You Like It; Defoe's Journal of the Plague Year in London; Irving's Tales of a Traveller; Hawthorne's Twice Told Tales; Longfellow's Evangeline; George Eliot's Silas Marner. The student is also urged to

the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any courses except the Classical and the Latin-Scientific.

2. *Geography*, general and political.

In 1898, and thereafter, Geography will not be required of candidates for admission to any course.

3. *History of the United States*, including the *Constitution*.

[Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement.]

4. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

5. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles. Solid Geometry.

6. *Elementary Physics.*

[Avery's Elements of Natural Philosophy (revised edition) is recommended; or Gage's Elements of Physics, if studied as intended by the author, with practical work in the laboratory and the calculation of problems arising in the work.]

In 1898, and thereafter, one year's work in GERMAN* will be included in the requirements for admission to the Technical Courses.

[This requirement in German will be satisfied by the completion of an amount equivalent to Joynes-Meissner's Grammar, Part I, Buchheim's Reader, and additional reading, such as Arnold's Fritz auf Ferien.

Division of Examinations for Admission.

Candidates for admission to the Freshman Class may pass all the examinations in June, or all in September, or partly in June and partly in September, or may take them in *two consecutive years.* In the latter case, for the Technical courses and the course in Science and Letters, candidates may present themselves for examination in the first year in the following subjects: English, Geography, History of the United States. No credit will be given unless the candidate has passed satisfactorily in at least three subjects in one year.

The examinations in Algebra, Geometry, and Physics must be passed in June or September of that year in which the candidate proposes to enter the University.

In the Latin-Scientific and Classical courses candidates may present themselves for examination in the first year in the following subjects: English, Geography, History of the United States, Physical Geography, Roman History, and Greek History. No credit will be given unless the candidate has passed at least four of the subjects in one year.

The examination in Latin may also be divided, but no credit will be given unless the candidate has passed in at least three of the topics specified at one examination. The examinations in the remaining subjects must be passed in June or September of that year in which the candidate proposes to enter the University.

Candidates intending to enter the University in September are advised to present themselves for examination in

*An equivalent amount in French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with reading of an additional amount equal to Cameron's edition of Contes de Daudet.

June; if they are not fully prepared at that time they will receive credit for the examinations then satisfactorily passed.

CONDITIONAL ADMISSION.

A candidate failing to pass in one or more of the subjects required for admission may, at the discretion of the Faculty, be admitted to his class conditionally, to make up his deficiencies by extra study. When they are made up, he will be received into full standing in his class.

SPECIAL STUDENTS.

Young men of advanced standing, who do not desire to take a full regular course, can enter and select special shorter courses, with the sanction of the Faculty; but in all cases satisfactory examinations must be passed upon the subjects required for entrance to the Freshman Class.

ADMISSION TO ADVANCED STUDIES.

Candidates for admission to advanced studies *in any course* are required to pass, *in addition to the entrance examinations for that course*, examinations in the work already done by the classes which they desire to enter. These examinations are held on the same days as those for entrance to the Freshman Class.

The additional subjects may be found in the program of studies.

A diploma showing that a degree has been conferred, or a certificate of studies taken at another College will be received, in so far as it covers the subjects required for entrance, in lieu of the *Primary Entrance Examinations only.*

ADMISSION TO GRADUATE COURSES.

Students of this University who have taken their *first* degree, and others, on presenting a diploma of an equivalent degree conferred elsewhere, are admitted to advanced studies, according to the plan to be found in the Register under the general subject of Graduate Students.

PREPARATORY SCHOOL CERTIFICATES.

The acceptance of a certificate as evidence of proficiency in lieu of examination is at the discretion of each Professor as to the subjects in his department. It has been the custom to accept certificates from schools of high standing in English, Geography, and United States History, but not in Mathematics or Physics. Beginning with the examinations of June, 1897, such certificates will not, as a rule, be accepted so as to dispense with the primary entrance examination in any subject. It is, however, regarded as highly desirable that the examiners should receive from principals of preparatory schools statements with reference to those whom they send up as candidates for entrance, indicating as clearly and fully as possible, in each case, the teacher's opinion of the candidate's character and scholarship and fitness for entering upon collegiate work; and such statements will receive careful consideration, in connection with the results of the entrance examinations.

PROGRAM OF STUDIES.

Showing the number of exercises per week for each subject, and the Text-books used.

The following is presented as the general program of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of drawing, three of work in the laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

SCHOOL OF GENERAL LITERATURE.

There are three courses in the School of General Literature of the University.

I. The Classical Course includes all that is prescribed in our best institutions for the degree of Bachelor of Arts (B.A.). It covers full instruction in Greek, Latin, English, French and German, Mathematics, Astronomy, Physics, Chemistry, Geology, Physiology, Hygiene, History, Psychology, Ethics, Philosophy, Political Economy, and Constitutional Law.

II. The Latin-Scientific Course differs from the first in omitting Greek, taking in its place an increased amount of the Modern Languages and of Mathematics. Students completing this course receive the degree of Bachelor of Science (B.S.).

III. The Course in Science and Letters, for which the same degree is given as for the last mentioned, contains no Latin or Greek, but furnishes instead extended instruction in French and German, History, General Literature, Mathematics, and General Science.

Instruction in all of these courses is given both by recitations and by lectures.

A student taking a literary course will be permitted to substitute, at the discretion of the Faculty, studies offered in one or another of the technical courses for a portion of the required work during Junior and Senior years. Such a student will receive the literary degree at the end of the fourth year. If he then desires to pursue the remaining branches in the technical course, he may receive the appropriate degree as soon as this is completed. The amount of additional time thus occupied will be probably from one and a half to two years, depending upon the courses selected and the diligence of the student.

It is believed that the benefit from such a combined course, which unites the advantages of literary training with a professional course, will recommend itself to many persons, and that the maturer condition of the student when he approaches his later work will enable him to make better use of the opportunities then afforded him.

DESCRIPTION OF THE COURSES.

GREEK.—During the first term of Freshman year the class reads several books of the Odyssey, giving attention to epic forms and syntax, to prosody and scanning, and to Homeric antiquities and mythology. The work of the second term is directed toward a thorough acquaintance with the idiom and vocabulary of Attic prose, as a preparation for rapid reading. The Œconomicus and Symposium of Xenophon and the Crito of Plato are read during the term, with sight readings from the Memorabilia and the Apology; accompanied with discussions of domestic life at Athens. The work of the year includes a thorough re-

view-drill on the principles of Greek accidence and syntax, and exercises in Greek prose composition are required, based, during the second term, on the reading done by the class. Greek history is studied throughout the year, with special reference to the development of political institutions.

The Sophomore class takes up, during the first term, the study of Herodotus and Thucydides. Selections are made from both authors with the purpose of illustrating their best style and at the same time of presenting, from the original sources, the history of certain interesting epochs; the reading from Herodotus, after some drill on the Ionic forms, being in large part at sight. During the second term the class reads one or two plays of Euripides, with attention to the history of Greek tragedy, the life of the author, and the analysis of the drama read. The lyric meters are studied, with the aim of gaining a knowledge of the rhythmical and metrical principles of Greek poetry. During this term an elective course is offered, the subject being Greek oratory, with the reading of certain orations of Lysias or Demosthenes, or both.

The Junior year is devoted to a further study of the drama, selected plays of Sophocles, Aristophanes, and Æschylus being read during the year. Work is also done in the study of public and private antiquities, partly in lectures by the professor and partly in original investigation on allotted subjects by the students.

During the first term of the Senior year the class reads either selections from Thucydides, or one of the dialogues of Plato. The second term is in part devoted to the reading of selected odes of Pindar, with careful study of the history of Greek lyric poetry and of the life and work of Pindar in particular. The course concludes with a review of the history of Greek literature, intended to summarize and harmonize the fragmentary views of the general subject gained from the study of particular authors and departments of literature.

Students who have presented a modern language for admission instead of Greek will, during Freshman and Sophomore years, cover the ground laid down in the entrance requirements. During Junior and Senior years they will take the Freshman and Sophomore courses, as outlined above.

LATIN.—Much of the training in the Freshman year is devoted to laying a good foundation in Latin grammar and in the translation of English into Latin. The authors studied are used to illustrate both of these, and a large amount is read at sight in order to cultivate quickness and readiness in the student. Roman history is begun, accompanied with full comments and lectures upon points of interest. Collateral reading will also be recommended each year throughout the course. Cicero: De Senectute and De Amicitia or the Philippics, Livy, and the Odes and Epodes of Horace are read this year. With the last named, training is given in Latin meters.

During this and the following year courses of lectures will be given upon Roman antiquities in addition to a text-book. The topography of Rome with its remains, ancient life in its various aspects, and the other departments of archæology will be discussed, illustrated by the new and extensive set of over 3600 magic lantern slides which have been prepared for this purpose.

The Sophomore year completes the text-book on Roman history. The Satires and Epistles of Horace will be read in the first term, and in the second the Agricola and Germania, with selections from the Annals of Tacitus, or Quintilian, together with sight reading.

In the Junior year, selected letters of Cicero and Pliny are read, followed by Persius and several plays of Terence and Plautus. The history of Roman literature is entered upon in the second term.

The work in the Senior year opens with Lucretius, accompanied with lectures on Roman philosophy. The course in the second term this year includes the study of ancient Latin, using Allen's Remnants of Early Latin,

supplemented by a series of lectures upon Latin Grammar and the history of the development of the language, together with several lectures upon the history of classical philology. Characteristic poems by various authors will be read with full comment and training in the discussion of the literary and critical points which come up.

HEBREW.—An elementary course in Hebrew, conducted by the Chaplain, is offered as an optional study, open to Seniors and Juniors of the whole University.

ENGLISH.—During the first term, Freshman year, Rhetoric is studied, both with the aid of a text-book and through practical exercises, with the design of stimulating invention and imparting the essentials of a clear prose style. In the second term, a brief history of the language is made the nucleus of work.

The Sophomores spend the first term in a careful study of all that is most typical in American literature; the second, in a critical study of the prose of DeQuincey, Macaulay, and Carlyle, following that with a rapid survey of English prose from the XIV to the XIX century.

The Juniors study models of the best Oratory, both English and American, as a preliminary to the writing and delivery of original orations at some time during the first term; and, during the second, specimens from the works of standard Essayists as models for original essays. Careful training is given in the writing and criticism of essays throughout the course. These will be frequent rather than long; on subjects partly literary and in part technical; and the student will be led to maintain a specific thesis with orderly balance of arguments and arrangement of parts.

Excellence in Oratory is encouraged by the annual contest for the Alumni Prizes, held on the 22d of February, and open to students of the Junior class in all courses.

Instruction in elementary Anglo-Saxon is given regularly for one term to the Juniors in the School of General Literature, to be followed in the next term by a more critical

study of the philology and history of the language than would be possible without such an introduction.

Seniors in the same school receive instruction in the early English of Chaucer and his contemporaries, and in the principles and practice of versification. They are required to write a short poem, or a critique of some book, of a purely literary cast, selected for their examination and review. The course is completed by a series of lectures on the English poets from Chaucer to Tennyson, and, later, by lectures on special topics in English Literature too important to be passed over with brief mention, yet too comprehensive to be treated earlier in the course. Topics for 1897 will be taken from the following list: (1) Influence of the Celtic Writings and Traditions of Britain on the Literature of England. (2) The Historical and Literary Value of Anglo-Saxon Literature. (3) The English Bible as an English Classic. (4) The Elizabethan Writers. (5) The Greater Victorian Poets.

Optional courses will be offered as occasion arises. A Reading Club will be formed, and the student will be encouraged to such private and supplementary reading as his time will permit, and to the formation of a small library of standard books.

MODERN LANGUAGES.—The study of modern languages is obligatory from the first term of the Sophomore year up to the close of the course. The student elects either French or German; or both, if time permits.

French.—The grammar is begun, reading being introduced immediately. The comparative and historical relations of the French to the English, and the connection of both with the Latin are carefully explained. As soon as possible the student is emancipated from the Reader and takes up, in a progressive way, the reading of different authors; preference being given to modern writers, because it is considered to be of the highest importance that he acquire the language as it is, as an instrument whereby further knowledge can be obtained.

In the class-room, the language taught is used by the teacher as much as possible, in order that the ear of the pupil may become accustomed to its sound. Dictation is also employed, in order to give training in spelling. The rules of grammar are taught by numerous written exercises. In the second term of the Junior year, compositions in French are required, upon subjects which have been previously explained in French, in order that the student may become acquainted with different expressions and forms of construction. Before entering upon the study of an author's works, his life and literary achievements are discussed in French, which is translated, if necessary. In the Senior year, twelve lectures are delivered upon the history of French literature. In addition to this, lectures in French upon the most distinguished modern authors are given to advanced students.

A weekly conversation-class affords opportunity for this kind of practice; and in it the events of the day and various historical and literary topics are discussed. Private courses of reading are also suggested to those who desire it.

German.—The German course follows the same plan as that laid down for the French, both as regards the methods employed and the opportunities afforded. The relations of English and German are dwelt upon and also those which connect the two languages with the Indo-European family.

MATHEMATICS.—The mathematical work is carried on during the Freshman and Sophomore years as follows:

Freshman year, first term, solid geometry, four exercises per week; plane trigonometry begun.

Second term, analytical geometry; plane and spherical trigonometry, including mensuration and use of logarithmic tables, together five exercises per week throughout the term.

Sophomore year, first term, higher algebra, three exercises per week.

Opportunity for the study of more advanced mathematics is given in the elective work of the Junior and Senior years.

ASTRONOMY.—This study is taken up during the first term of the Senior year, Young's General Astronomy being used as the text-book. There are three exercises a week, and visits to the observatory help to make the work interesting as well as profitable.

CHEMISTRY.—This study includes a complete course of lectures in Freshman year upon general inorganic chemistry, in which the principles of the science are fully covered. These are illustrated by experiments, and are sufficiently extended to enable a student who desires to pursue the subject further to take analytical chemistry as an elective in the second term of the Sophomore year. The text-book used in connection with the lectures is Remsen's Inorganic Chemistry.

PHYSICS.—This important subject is presented in a course of lectures during the first term of the Sophomore year, three times a week. These are illustrated by means of the very complete apparatus of the physical laboratory. In the course in Science and Letters, the work in this branch is more extended and is identical with that given to the Civil and Mechanical Engineers. It occupies five hours a week in the first term, when heat, magnetism, and electricity are discussed. Throughout the second term, three hours a week are devoted to sound and light.

GEOLOGY.—In the second term of the Senior year, a course of lectures is given in connection with Le Conte's text-book. The general principles of the science are explained, and the theories of the formation and stratification of rocks, the successive periods of the development of the earth's crust, the extinct forms of life and similar questions are treated.

PHYSIOLOGY AND HYGIENE.—These subjects are taught in a course of lectures during the Freshman year.

HISTORY AND POLITICAL SCIENCE. — The study of history begins with a course in the political antiquities of Greece and Rome. [See the Departments of Greek and

Latin.] This is followed by the study of an outline of universal history (with text-book), and this by a fuller study of the political history of recent times, especially of that of England and France. During the first term of Senior year, there is a course of lectures upon the period covered by Gibbon's Decline and Fall of the Roman Empire.

The course in history is accompanied and supplemented by courses of lectures on constitutional law with special application to the Constitution of the United States; and also on international law.

Instruction is given by lectures on the elements of political economy. The student is made familiar with the facts, methods, and doctrines of the science, and is encouraged to form and present his own opinions.

LOGIC.—Junior Class, first term, two hours weekly. Text-book, Prof. Jevons' "Lessons in Logic," supplemented by occasional lectures and by references to more extended logical treatises, such as those of J. S. Mill, Sir William Hamilton, Archbishop Thompson, Baynes' Port Royal Logic, etc.

MENTAL AND MORAL PHILOSOPHY.—The work in this department will be conducted chiefly by lectures, interrupted by occasional examinations. The courses at present are the following:

Outlines of Physiological Psychology.—Junior Class, second term. These lectures are founded principally on Wundt's lectures on the same subject, Wundt's Grundzüge der Physiologischen Psychologie, James' Psychology, Baldwin's Handbook, Ladd's Elements of Physiological Psychology, Lotze's "Medicinische Psychologie," Ranke's "Der Mensch," Sully's Outlines of Psychology, Carpenter's Mental Physiology, Maudsley's Physiology and Pathology of the Mind, Bain's Mind and Body, etc., with references to the classical works of Weber, Fechner, and Helmholtz.

The History of Philosophy.—Senior Class, both terms. First term, Ancient and Medieval Philosophy. Second term, Modern Philosophy. These lectures will include a statement of the conception and problems of philosophy,

a brief sketch of the great ethnical religions, and of the history of Oriental philosophy. The philosophy of the Greeks will be treated in detail, with illustrations from the writings of the philosophers.

The history of medieval philosophy will be prefaced by a short description of the philosophical ideas underlying Christianity, and it will contain an account of the more important Church Fathers and Schoolmen.

The history of modern philosophy will begin by tracing the effect on philosophical thought of the ideas contributed by the Renascence and by the Reformation. From Lord Bacon on, a detailed history of the great modern philosophical systems will be given, which will be continued to those of our own times, including that of Mr. Spencer.

ANTHROPOLOGY.—Senior Class, both terms. These lectures aim at laying the foundation of a scientific study of Man. They include the rudiments of anthropometry and craniology. The earlier lectures give an account of the development, structure, and life of the human body; while the later lectures endeavor to describe the salient peculiarities of existing and prehistoric races of men.

They are based, for the most part, on the works of Bischoff, Broca, Darwin, Hartmann, Haeckel, Huxley, Quételet, Ranke, Virchow, etc.

CHRISTIAN EVIDENCES. — Senior Class, second term. Lectures on Christian evidences, which will endeavor to treat of the subject both from the side of natural science and from that of biblical criticism.

No complete course in Ethics has as yet been established, but the history of ethics is included in the history of philosophy.

THE COURSE IN SCIENCE AND LETTERS

substitutes the following for the Latin and Greek:

DRAWING.—In the first term of the Freshman year the student is instructed in elementary projections, shading, and lettering.

ZOÖLOGY AND BIOLOGY.—The study of these subjects covers one year, beginning with the second term of Sophomore year. The work begins with a description of the various animal functions, and is extended to the comparative anatomy and physiology of the organs in typical species. Systematic zoölogy is then completed and followed by practical biology.

CHEMISTRY.—In addition to the course in general chemistry described above, three exercises a week in qualitative analysis are taken in the second term of the Freshman year.

MINERALOGY.—Instruction in mineralogy is given to the students in the Course in Science and Letters throughout the Junior year. In the first term, they attend a course of lectures on crystallography, followed by a series of practical exercises in the determination of crystalline forms by the aid of models and natural crystals.

In the second term a course on the physical properties of minerals and on descriptive mineralogy, with the use of E. S. Dana's Text-Book of Mineralogy, is followed by practical exercises in the determination of minerals.

GEOLOGY.—The study of lithology is pursued in the first term of the Senior year, with laboratory practice, Williams' Lithology being used as the text-book. During the next term, the course given above is taken with the Classical and Latin-Scientific students.

THE CLASSICAL COURSE.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (3)

Greek.—Homer: Odyssey. Prosody. (2)

Latin.—Cicero: De Senectute and De Amicitia. Livy begun. Prose composition. (2)

Physiology and Health.—Lectures. (1)

English.—Rhetoric. (2) Lecture. (1) Essays.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Greek.—Xenophon: Œconomicus. (3)

Latin.—Livy completed. Horace: Odes and Epodes. Composition and prosody. (4)

History.—History of Greece. (2) History of Rome. (1) Roman antiquities.

English.—History of the English Language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Physics.—Lectures. (3)

French.—Whitney's Practical French Grammar. Super's French Reader. (2) Or *German.*—Brandt's Grammar. Lodeman's Manual of Exercises. Buchheim's Reader. (2)

Greek.—Herodotus. (4)

Latin.—Horace: Satires and Epistles. Composition. (3)

History.—History of Rome. (1) Antiquities.

English.—American literature. (2) Essays.

SECOND TERM.

REQUIRED.

French.—Grammar and reader (continued). (2) Or *German.*—Grammar, exercises, and reader (continued). (2)

History.—Weber's Outlines of Universal History. (2)

Greek.—Euripides: Medea. (3)

Latin.—Tacitus: Agricola, Germania, and Annals, or Quintilian: Book X. Composition. (3) Antiquities.

English.—English prose literature. (2) Essays.

ELECTIVE.

(*At least four hours per week to be selected.*)

Greek.—Demosthenes: De Corona. (2)

Latin.—Plautus. (2)

French.—Grammar and reader. (2)

German.—Grammar and reader. (2)

Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (5)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Drawing.—Tracings and blue prints. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., illustrated from examples of mining and metallurgical plant. (4)

JUNIOR CLASS.

FIRST TERM.

REQUIRED.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2)

Philosophy.—Jevons's Lessons in Logic. (2)

English.—English and American Orators. (1)

French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2) Or *German.*—Grammar. Beresford-Webb: German Historical Reading Book. (2)

ELECTIVE.

(*At least eight hours per week to be selected.*)

English.—Anglo-Saxon. (2)

Greek.—Sophocles: Antigone. Antiquities. (3)

Latin.—Letters of Cicero and Pliny. (3)

Mathematics.—Differential and integral calculus. (4)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical Laboratory. (1) Electrical Laboratory. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Toxicology.—Lectures. (2)

SECOND TERM.

REQUIRED.

History.—History of England: Hume. (3)

Philosophy.—Lectures on the outlines of physiological psychology. (2) Political economy. (1)

English.—British Essayists. (1)

French.—Prose Composition. Labiche et Martin: Le Voyage de M. Perrichon. Short stories by François Coppée and Guy de Maupassant. Dictation. (2) Or *German.*—Buchheim's Prose Composition. Goethe: Hermann und Dorothea. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2)

ELECTIVE.

(*At least eight hours to be selected.*)

English.—Philology of the English tongue. (2)

Greek.—Aristophanes: Clouds. Æschylus: Prometheus. (3)

Latin.—Persius, Plautus, and Terence. History of Roman literature. (3)

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

SENIOR CLASS.

FIRST TERM.

REQUIRED.

History.—Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

Astronomy.—Young's General Astronomy. (3)

French. — Sadler's Exercises. Readings in Corneille, Racine, Molière, etc., and contemporary authors. Compositions. Lectures on French literature. (2) Or *German.*—Grammar. Readings in Lessing, Herder, Goethe, Schiller, etc., and contemporary authors. Compositions. Lectures on German literature. (2) Conversation class in both languages optional throughout the year.

ELECTIVE.

(*At least six hours to be selected.*)

English.—Chaucer and his contemporaries. (2)

Greek.—Plato: Phædrus. Greek philosophy. (2)

Latin.—Lucretius, with lectures. Roman literature. (2)

Mathematics.—Hyperbolic trigonometry, theory of errors and least squares. (2)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Mechanics of Machinery. — Hermann-Smith. Graphical Statics of Mechanisms. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on experimental tests. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis, and Conference. (6)

SECOND TERM.

History.—History of France. (2)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

French.—Readings. Compositions. Lectures in French on modern French authors. (2) Or *German.*—Readings. Compositions. Lectures in German on modern German authors. (2)

Geology.—Lectures. Le Conte. (2)

ELECTIVE.

(*At least six hours to be selected.*)

English.—Study of Verse. (2)

Greek.—Pindar: selected odes. Greek literature. (2)

Latin.—Cicero: De Officiis. Lectures on the history of classical philology. (2)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Astronomy.—Practical Astronomy: observatory work. (2)

Steam Engine.—Holmes' Steam Engine. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis, and Conference. (6)

Architecture.—The history and styles of architecture. (2)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Preparation of Thesis.

THE LATIN-SCIENTIFIC COURSE.

The Latin-Scientific Course, leading to the degree of Bachelor of Science (B.S.), is based on Latin without Greek.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (3)

German.—Joynes-Meissner's Grammar. Buchheim's Reader. (3)

Latin.—Cicero: De Senectute and De Amicitia. Livy begun. Prose composition. (2)

Physiology and Health.—Lectures. (1)

English.—Rhetoric. (2) Lecture. (1) Essays.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

German.—Grammar and Reader (continued). Short stories by different modern authors. (3)

History.—History of Greece. (2) History of Rome. (1) Roman antiquities.

Latin.—Livy (completed). Horace: Odes and Epodes. Composition and prosody. (4)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Physics.—Lectures. (3)

French.—Whitney's Practical French Grammar. Super's Reader. (2)

German.—Advanced Grammar. Short stories by different modern authors. (2)

History.—History of Rome. (1) Antiquities.

Latin.—Horace: Satires and Epistles. Composition. (3)

English.—American literature. (2) Essays.

SECOND TERM.

French.—Grammar. Reader (continued). (2)

German.—Prose Composition. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2)

History.—Weber's Outlines of Universal History. (2)

Latin.—Tacitus: Agricola, Germania, and Annals, or Quintilian: Book X. Composition. (3) Antiquities.

English.—English prose literature. (2) Essays.

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (4)

JUNIOR CLASS.

FIRST TERM.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2)

Philosophy.—Jevons's Lessons in Logic. (2)

English.—Anglo-Saxon. (2) English and American Orators. (1)

French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2)

German.—Readings in Lessing, Herder, Goethe, Schiller, and contemporary authors. Dictation. Compositions. (2) Conversation class in German optional throughout the year.

Latin.—Letters of Cicero and Pliny. (3)

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Lectures on the outlines of physiological psychology. (2) Political economy. (1)

English.—Philology of the English Tongue. (2) British Essayists. (1)

French.—Prose Composition. Labiche et Martin: Le Voyage de M. Perrichon. Short stories by François Coppée and Guy de Maupassant. Dictation. (2)

German.—Readings (continued). Dictation. Compositions. (2)

Latin. — Persius, Plautus, and Terence. History of Roman literature. (3)

NOTE.—Calculus may be substituted for Latin throughout the Junior year.

SENIOR CLASS.

FIRST TERM.

History. — Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

Astronomy.—Young's General Astronomy. (3)

English.—Chaucer and his contemporaries. (2)

French.—Readings in Corneille, Racine, Molière, etc., and contemporary authors. Lectures on French literature. (2)

German.—Readings (continued). Compositions. Lectures on German literature. (1) Conversation class in both languages optional throughout the year.

Latin.—Lucretius, with lectures. Roman literature. (2)

SECOND TERM.

History.—History of France. (2)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

Geology.—Lectures. Le Conte. (3)

English.—Study of Verse. (2)

Latin.—Cicero: De Officiis. Lectures on the history of classical philology. (2)

French.—Readings (continued). Compositions. Lectures in French on modern French authors. (2)

German.—Readings (continued). Compositions. Lectures in German on modern German authors. (1)

NOTE.—Physics may be substituted for Latin throughout the Senior year.

Preparation of Thesis.

COURSE IN SCIENCE AND LETTERS.

The Course in Science and Letters, leading to the Degree of Bachelor of Science (B.S.), is designed for those who wish to pursue both scientific and literary studies without Latin and Greek. These being omitted, extended instruction is given in French and German, History, General Literature, Mathematics and General Science.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (3)

German. — Joynes-Meissner's Grammar. Buchheim's Reader. (3)

Drawing.—Elementary projections, shading and lettering. (2)

Physiology and Health.—Lectures. (1)

English.—Rhetoric. (2) Lectures. (1) Essays.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

History.—History of Greece. (2) History of Rome. (1)

German.—Grammar and Reader (continued). Short stories by different modern authors. (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Laboratory. (2)

Chemistry.—Fresenius's Quantitative Analysis. (3)

French.—Whitney's Practical French Grammar. Super's Reader. (2)

German.—Advanced Grammar. Short stories by different modern authors. (2)

History.—History of Rome. (1) Antiquities.

English.—American literature. (2) Essays.

SECOND TERM.

Physics.—Heat, magnetism, and light. Lectures. (2) Laboratory. (1)

Zoölogy.—Lectures. Orton. (2)

Steam Engine.—Holmes's Steam Engine. (4)

French.—Grammar. Readings (continued). (2)

German.—Prose Composition. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. (2)

History.—Weber's Outlines of Universal History. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2)

Philosophy.—Jevons's Lessons in Logic. (2)

English.—Anglo-Saxon. (2) English and American Orators. (1)

French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2)

German.—Readings in Lessing, Herder, Goethe, Schiller, and contemporary authors. Dictation. Compositions. (2) Conversation class in German optional throughout the year.

Zoölogy.—Lectures on biology. (2)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Lectures on the outlines of physiological psychology. (2) Political economy. (1)

English.—Philology of the English Tongue. (2) British Essayists. (1)

French.—Prose Composition. Labiche et Martin: Le Voyage de M. Perichon. Short stories by François Coppée and Guy de Maupassant. Dictation. (2)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Compositions. (2)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. (3)

SENIOR CLASS.

FIRST TERM.

History.—Decline and Fall of the Roman Empire. (3)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

Astronomy.—Young's General Astronomy. (3)

English.—Chaucer and his contemporaries. (2)

French.—Readings in Corneille, Racine, Molière, etc., and contemporary authors. Compositions. Lectures on French Literature. (2)

German.—Readings (continued). Compositions. Lectures on German Literature. (1)

In both languages conversation class optional throughout the year.

Geology. — Williams' Lithology and laboratory practice. (2)

SECOND TERM.

History.—History of France. (2)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

English.—Study of Verse. (2)

French.—Readings (continued). Compositions. Lectures in French on modern French authors. (2)

German.—Readings (continued). Compositions. Lectures in German on modern German authors. (1)

Geology. — Historic and dynamic geology. LeConte. (3)

Preparation of Thesis.

THE SCHOOL OF TECHNOLOGY.

This school includes seven distinct courses:

I. The Course in Civil Engineering.
II. The Course in Mechanical Engineering.
III. The Course in Mining Engineering.
IV. The Shorter Course in Mining.
V. The Course in Electrical Engineering.
VI. The Course in Chemistry.
VII. The Course in Architecture.

These have the same curriculum of studies for the first term of the Freshman year; except that students who propose to take the course in Mechanical Engineering or that in Analytical Chemistry are required to take German. Students taking any of the other technical courses are strongly advised to elect German, but are not required to do so. After the first term the student follows the program of the course which he has selected.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Algebra. (3) Plane trigonometry. (1)
Chemistry.—Lectures. Remsen's Inorganic Chemistry. (3)
German. — Joynes-Meissner's Grammar. Buchheim's Reader. (3) Or *French.* — Whitney's Practical French Grammar. Super's Reader. (3)
Drawing.—Free-hand sketching and lettering. (2)
English.—Rhetoric. (2) Lecture. (1) Essays.
Physiology and Health.—Lectures. (1)

THE COURSE IN CIVIL ENGINEERING.

The special technical studies in this course may be grouped under the heads of Surveying, Applied Mechanics, Road and Railroad Construction, Bridge Design, and Hydraulic and Sanitary Engineering.

The work in Surveying extends over four terms and embraces land surveying, leveling, topography, triangulation, railroad reconnaissance and location, hydrography, and the elements of geodesy. A large equipment of transits, levels, and other surveying tools affords students the opportunity of becoming familiar with the instruments of different manufacturers. Much time is devoted to practice in the field and drafting room, each student being required to become proficient in the use of instruments, in taking field notes, and in map-drawing. Particular attention is paid to the execution of topographical surveys and maps by the best modern methods. Railroad maps and profiles are made from actual field location. During the Senior year there is done secondary triangulation work of a high order of precision.

The work in Applied Mechanics comprises the strength and elasticity of materials, the theory of the equilibrium of arches, roofs and bridges, that part of the mechanics of machinery which relates to locomotives and hoisting machines, and the theory of hydraulics and hydraulic motors. Here the theoretical principles are illustrated by examples and problems taken as far as possible from actual engineering practice. Tests and experiments on materials are made in the testing laboratory.

The course in Construction familiarizes the student with the qualities of materials used in engineering structures, with methods of preservation and testing, with masonry and foundations, and with the building and maintenance of roads and railroads. All the standard tests for hydraulic cements and mortars are made by each student.

The course in Bridge Design is preceded by the theory of computation of stresses by both analytical and graphic methods. Starting with the specifications for a first-class iron highway or railroad bridge, each student then makes the full computations, designs, working drawings, and bills of material for a plate girder, a lattice girder, and a pin-connected truss bridge. The weight of the designed bridge is finally determined and compared with the dead load

assumed for the calculations. The drawings are made and dimensioned in the same manner as in the drafting-office of a bridge company. In connection with this course visits of inspection to bridges in the vicinity are regularly made.

The work in Hydraulic and Sanitary Engineering begins with the study of systems of water supply, the collection, purification, and distribution of water, the combined and the separate systems of sewerage, the methods for the disposal of sewage, and the best practice for the drainage of houses. This is followed by the theory of the flow of water in pipes and channels, together with the subject of hydraulic motors.

Beginning with the summer of 1898, students taking the Course in Civil Engineering will be required to take a part of the Surveying included in that course at the Summer School (see page 98). The time heretofore given to this subject will thus be made available for instruction in other subjects, and the course thereby extended and enriched.

Besides these special studies there is a course in astronomy, which includes practical work in the observatory. The study of English, and of French or German, is continued, and instruction is given during four terms in crystallography, mineralogy, lithology, and geology.

The student who completes all the studies of this course will receive the degree of Civil Engineer (C.E.).

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Construction.—Materials, masonry, and carpentry. Roads, streets, and pavements. Sketches of structures. (2)

Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)

German.—Grammar and reader (continued). Short stories by different modern authors. (3) Or *French.*—Grammar and reader (continued). (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

Architectural Drawing.—Plans of piers and arches. Problems in stone cutting. Use of water colors. (3)

German.—Advanced Grammar. Short stories by different modern authors. (2) Or *French.*—Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Land Surveying.—Theory and use of compass, level, and transit. Surveys and maps of farms. Leveling. (4)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2) Or *French.*—Advanced Grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Hyperbolic trigonometry, theory of errors and least squares. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Construction.—Foundations, arches, walls, dams, and bridges. Visits of inspection. (3)

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographic maps. (3)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Or *French.*—Corneille, Racine, Molière, Hugo, etc. Dictation. Compositions. (2) Conversation class in both languages optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Roofs and Bridges.—Theory and calculations of stresses in roof and bridge trusses. (5)

Sanitary Engineering.—Collection, purification and distribution of water. Systems of water supply and sewerage. Disposal of sewage. House drainage. Irrigation engineering. (2)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. (3)

German or French.—Readings. Compositions. Lectures on German or French literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Astronomy.—Descriptive Astronomy. (3)

Bridges.—Graphic statics. Design of plate girders, riveted bridges, and pin-connected trusses, with working drawings. (7)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (2)

Mechanics of Machinery.—Pile drivers, cranes and elevators. The mechanics of the locomotive. (2)

Geology.—Williams' Lithology, with practical exercises in determining rocks. (2)

SECOND TERM.

Astronomy.—Practical Astronomy; observatory work. (2)

Bridges.—Theory of cantilever, draw, continuous, suspension, and arched structures. (3)

Hydraulics.—Hydrostatics. Efflux of water from orifices and flow in pipes and rivers. Hydraulic motors. (3)

Electricity.—Equipment and operation of electric railways. Measurement of power. (2)

Geology.—Historic and dynamic. Le Conte. (3)

Christian Evidences.—Lectures. (1)

Preparation of Thesis. (3)

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines. The principal subjects taught are: The nature, equivalence, and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, Mechanical Technology, and the principles and practice of Machine Design.

That the students may obtain the practical engineering data which they will most need when beginning their

work as mechanical engineers they are required to pursue a course of Shop Instruction which does not necessarily involve manual labor and manipulation of tools, but is principally devoted to familiarizing them with those points in pattern-making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is therefore directed to the forms and sizes of machine parts that can be readily constructed in the various workshops, to the time that it takes to perform, and the order of, the various operations, to the dimensions most needed by workmen and to the various devices for increasing the accuracy of the work, durability of the parts, and convenience of manipulation. This involves acquaintance with the processes and machinery of the workshops, but it is the foreman's and superintendent's knowledge which is required rather than the manual dexterity and skill of the workman and tool-hand. The acquirements peculiar to the latter are by no means despised and the students are encouraged to familiarize themselves therewith during leisure hours, but manual work in the shops forms no regular part of the course. On the contrary, the student enters the shop with hands and mind free to examine all processes, operations, and machinery, and is ready at the call of the teacher to witness any operation of special interest. Provided with note-book, pencil, calipers, and measuring rule, the student sketches the most important parts of the various machine-tools, notes down the successive steps of each of the important shop-processes as illustrated by the pieces operated upon, and follows the pieces of work through the shops from the pig or merchant form to the finished machine.

That the students may learn to observe carefully and be trained to think and observe for themselves in these matters, there is required of them a full description of the various processes, operations, and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings, and finished pieces, which are not under construction in the shops at the time and the

drawings for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed program given him at the start, but also personally by a teacher, who accompanies him into the shops, gives necessary explanations, and tests the extent and accuracy of his knowledge by examining the sketches and notes and by frequent questioning. Finally the results of the observations and the sketches are embodied in a memoir.

During the course there are frequent visits of inspection to the Bethlehem Iron Company, the L. V. R. R. Shops at Easton, and other engineering works both in and out of town, with special reference to such subjects as machine elements, prime movers, machinery for lifting, handling and transporting, and machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students. These visits are also made the occasion for constant practice in the free-hand sketching of machinery.

The instruction in Machine Design begins with second term of the Freshman year and is continued throughout the course. At first tracings and blue prints of good examples of machine drawings are made. A thorough drill in projection drawing follows; in this work free-hand sketches are first made, and measurements taken, of machine pieces; these sketches are then converted into full-size working drawings. Then there is considerable practice in the interpretation of such drawings, and general views of lathes, planers, drills, and shapers are made from the drawings of the details. This is followed by difficult projections and intersections and exercises in the empirical proportioning of machine parts. Both empirical and rational formulas are used to determine the dimensions of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers and connecting rods, the data being given as they would arise in practice and the drawings made full size. During the Junior year the class takes up the design

of a high-speed steam engine, every dimension being determined by the students and complete drawings made. During the Senior year the students undertake the calculations, estimates, and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. From the finished drawings of each machine tracings are made and then blue prints taken for distribution among the other members of the class. In the case of the machines and of the engine the general plan or arrangement will be given to the students in the form of rough sketches, photographs, or woodcuts. In the last term the students are expected to make original designs for simple machinery, whose object has been fully explained. Throughout the course the work in the draughting-room is carried on as nearly as possible like that of an engineering establishment, and special attention is paid to methods of expediting the work of calculation by means of simple formulas, tables, and diagrams.

Beginning with the summer of 1898, a part of the work included under the head of Shop Visits will be given at a Summer School, beginning immediately after the close of the Second Term and extending over three or four weeks. Attendance at the Summer School will be required. The time heretofore occupied by this work will thus be made available for instruction in other subjects, and the course thereby extended and enriched.

All the students in this course are required to study German.

The graduates in this course will receive the degree of Mechanical Engineer (M.E.).

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (5)

Visits of Inspection.—Examination and sketching of principal machine parts in the shops of the vicinity. (1)

German.—Grammar and reader (continued). Short stories by different modern authors. (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers, and connecting rods. (2)

Visits of Inspection.—Examination and sketching of principal machine parts in the shops of the vicinity. (1)

German.—Advanced Grammar. Short stories by different modern authors. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

Steam Engine.—Holmes' Steam Engine. (4)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics. — Projective geometry. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on experimental tests. (4)

Mechanics of Machinery.—Hermann-Smith. Graphical Statics of Mechanisms. (2)

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern-making, moulding, forging, fitting, and finishing, with sketches and reports. (5)

Boilers.—Wilson. Strength, construction, and wear and tear of boilers. (1)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Conversation class optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Kinematics of Machinery.—Nature and equivalence of mechanisms. Diagrams of the changes of position, speed, and acceleration in mechanisms. Valve and link motions. (6)

Machine Design.—Calculations and working drawings for a high-speed steam engine. (5)

Machinery of Transmission.—Weisbach-Herrmann. (3)

German.—Readings. Compositions. Lectures on German literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Thermodynamics. — General principles; application to steam engines and air compressors. (3)

Graphical Statics.—Graphical analysis of roof trusses and girders. (2)

Machine Design.—Calculations and working drawings for hoisting, pumping, and metal-working machinery. (3)

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Mechanics of Machinery.—Weisbach-Herrmann. Hoisting machinery, accumulators, cranes, and locomotives. (2)

SECOND TERM.

Mechanics of Machinery.—Weisbach-Herrmann. Pumps, pumping engines, blowing engines, compressors, and fans. (4)

Machine Design.—Original designs. (5)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

THE COURSES IN MINING ENGINEERING.

These courses aim to fit the student for practical work in either of the branches of mining, metallurgy, metallurgical chemistry, or geology. On account of the great number and scope of the studies necessary to the attainment of the degree of Engineer of Mines (E.M.), which includes that of Metallurgist, five years are required. At the end of the fourth year the student will have completed a course simi-

lar to that leading to the scientific degree in other institutions, and will receive the degree of Bachelor of Science (B.S.). On completing the first year, those who desire to practice mining alone are provided with a special course leading to the degree of Bachelor of Science (B.S.) in mining. The following program of subjects and studies shows the requirements for the degree of Engineer of Mines.

Modern Languages.—Although the option of studying French or German lies with the student, it may be well to note that the current literature of the subjects taught in these courses is more abundant in the latter language.

Drawing and Construction.—The course in mechanical drawing begins with tracings of good examples of machine drawings; then follow the interpretation of such drawings, and the making of general views of machines from detailed sketches, exercises in projection drawing from the same, and the proportioning of simple tools and machines.

A brief course in descriptive geometry is given, in which the student is grounded in the fundamental principles of the subject. The simpler applications are given in the form of problems, and a number of practical examples are worked out in the drawing room.

Under the charge of an instructor, the students make visits of inspection to mines and metallurgical works, during which they examine and make sketches of portions of the plant, and take notes concerning it. From these sketches and notes they subsequently make working drawings accompanied by written memoirs explanatory of the construction and operation of the plant.

In a later portion of the course, the students are required to make original designs for mining and metallurgical plant under given conditions, involving exercise in the adaptation and proportioning of structures, machinery, and apparatus to suit the conditions given.

The field work in mining and geological surveying is followed by map construction from field notes.

CHEMISTRY. — The course in theoretical and applied chemistry extends over three years and includes work in wet and dry assaying of all the important ores and metallurgical products met with in actual practice, combined with the working of stoichiometric problems and the study of chemical philosophy. The practical work is that required for a metallurgical chemist or assayer.

With moderate care the expenses in this department need not exceed $120.

MINERALOGY.—This subject is divided into two courses. In the first course, after a short exposition of the laws of crystallography and a description of crystalline forms, practical exercises are held in the determination of simple and complex crystals, in which the student is taught to identify the various crystalline forms observed in minerals by the aid of models and of actual crystals, and with the use of the application goniometer. The second course includes the subjects of physical, descriptive, and determinative mineralogy. As in the first course, the greater part of the time is devoted to practical exercises, which, in this course, have for their object the determination of minerals. Each student is thus enabled to become familiar with the more common minerals by the actual handling of several hundred specimens, with the facility of making such tests as will not injure them. The presence of one or more instructors during each exercise permits the student to make frequent reports of his determinations, and to receive much instruction as to the characteristics of the minerals. The knowledge thus acquired can be supplemented by visits to the museum.

The course in blowpipe analysis may be considered as auxiliary to the practical exercises in determinative mineralogy. In the latter the student is urged to rely chiefly on physical tests; in the former he is required to determine minerals by the aid of the blowpipe.

The mineralogical laboratory offers facilities for an advanced course in crystallography and in physical and

microscopic mineralogy to a few students who may receive permission to pursue such a course.

GEOLOGY.—This subject is studied with special reference to the needs of the mining engineer. Within a radius of twenty miles the student meets and becomes acquainted with the rocks of the archæan, the palæozoic, and the mesozoic formations, and makes geological maps from his own field notes, paying attention to the lithological characters of the formations, as they are mainly non-fossiliferous south of the Blue Ridge. An extended practical course in lithology familiarizes the student with the rocks of importance to the mining engineer and enables him to determine them by sight. There are over 2500 specimens in the collections, embracing nearly all the known species. The course in historic geology is illustrated by a cabinet of typical specimens. The course in economic geology supplements the above work by familiarizing the student with the geological horizon of all the valuable constituents of the earth's crust and the theories of their formation. As Bethlehem is near the center of the "extra-morainic" drift, exceptional facilities are afforded for the study of pleistocene geology in Eastern Pennsylvania.

ASTRONOMY.—After studying the theory of the subject two-thirds of the year are devoted to practical work in the observatory.

APPLIED MECHANICS.—This embraces hydraulics, a study of the steam engine, and the mechanics of machines employed in mining and metallurgy.

SURVEYING.—A course extending over five terms offers practice in land, mine, and geological surveying, leveling, topography, triangulation, railroad reconnaissance and location, and the use of the solar transit. It also includes practical work in drawing and map construction.

Beginning with the summer of 1898, students taking either of the Courses in Mining Engineering will be required to take a part of the surveying included in those

courses at the Summer School (see page 97). The time heretofore given to this subject will be made available for instruction in other subjects, and the course hereby extended and enriched.

METALLURGY.—There are two courses, making, together, about one hundred and forty lectures on this subject, which extend throughout a year. In these the chief object kept in view is a clear presentation of the principles involved in the various metallurgical processes, looked upon as the application to practice of the laws of chemistry, physics, and mechanics. This is followed, in the case of each process, by a description of the more important examples of the plant and of the methods of conducting the process, and by indications concerning its economic features. In order to ensure the student's understanding the fundamental principles of metallurgy, and his becoming so familiar with them as to be able readily to apply them, he is required to solve a series of problems in which these principles are involved. Many of the problems are such as are likely to present themselves to the metallurgist in his current practice.

The metallurgical laboratory affords opportunity for special investigations in subjects connected with metallurgy to such advanced students as are competent to conduct them.

MINING.—This subject is covered by three courses. The first begins with the application of economic geology to the needs of the engineer, so that he can study and value mining properties, locate appropriately the necessary plant, and calculate the cost of production. It includes the discussion of faults and the means of finding faulted bodies, with practical problems. The subjects of blasting, timbering, and winning deposits are applied to actual cases, as tunnel-driving, etc., and problems from practical data are solved by the students. The second course covers the subjects of underground and surface haulage; loading, unloading, and stocking ores; pumping; ventilation; hygiene

and mining law. A series of problems is given in each of these subjects to cover cases that meet the engineer in ordinary practice. The third course treats of the mechanical preparation of ores by the wet, dry, or magnetic methods, and especially of the preparation of anthracite coal.

The location of the University in the vicinity of the iron works of the Lehigh Valley, and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc and Iron Co. The facilities for the practical study of mining and economic geology are not excelled by those of any other institution in the country. The zinc mines at Friedensville, the paint ores of the Marcellus formation, and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the semi-bituminous and anthracite coal fields, the block and fossil iron ores of the Clinton measures, the iron mines at Cornwall, Pennsylvania, and the iron and zinc mines of New Jersey; together affording examples of nearly all the methods of winning and dressing valuable deposits. Numerous visits of inspection are made in connection with the work of the course, to familiarize the student with metallurgical and mining processes and afford data for practical examples and projects.

THE COURSE IN MINING ENGINEERING.

This course is arranged so that the subjects which prepare the student for practice in the field of metallurgy shall be completed at the end of four years, when the graduate will receive the degree of Bachelor of Science in Metallurgy (B.S.). By remaining a year longer, and taking the subjects laid down for the graduate year, the graduate in the course may obtain the degree of Engineer of Mines (E.M.).

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Stoichiometry. (2)

German.—Grammar and reader (continued). Short stories by different modern authors. (3) Or *French.*—Grammar and reader (continued). (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics. — Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

Drawing.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., accompanying the study of descriptive geometry and illustrated from examples of mining and metallurgical plant. (4)

German.—Advanced Grammar. Short stories by different modern authors. (2) Or *French.*—Advanced Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

Drawing.—Flat tinting with water colors. Graphical problems illustrating the direction and extent of throw in faults. Examination and sketching of metallurgical plant in the vicinity. General views and working drawings of the plant examined, accompanied by written descriptions of its construction and operation. (4)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2) Or *French.*—Advanced Grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Hyperbolic trigonometry, theory of errors and least squares. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Chemistry.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Copper ore (Cu).
3. Silver coin (Au, Ag, Pb, Cu).
4. Zinc ore (Zn). By both gravimetric and volumetric methods.
5. Bronze (Cu, Sn, Zn, Pb).
6. Spiegeleisen (Mn).

Chemical Philosophy.—Tilden. Chemical calculations. Whiteley. (3)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Or *French.*—Corneille, Racine, Molière, Hugo, etc. Dictation. Compositions. (2)

Conversation class in both languages optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Quantitative analysis: laboratory work: Fresenius. (3) The following analyses are executed by the student:

7. Lead ore (Pb,S).
8. Ilmenite (TiO_2).
9. Iron ore (complete analysis).
10. Limestone (complete analysis).
11. Coal (volatile matter, fixed carbon, ash, H_2O, S, P).

Steam Engine.—Holmes' Steam Engine. (4)

Land Surveying.—Theory and use of level and transit. Field practice and map drawing. (2)

German or French.—Readings. Compositions. Lectures on German or French literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Blow-Pipe Analysis.—Practice. (1)

Lithology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Mechanics of Machinery.—Herrmann-Smith. The graphical statics of mechanisms. (2)

Assaying.—Including the assay by the dry methods of gold, silver, antimony, lead, iron, and tin ores, coal, and gold and silver bullion. Laboratory work. Ricketts. (3)

Chemistry. — Quantitative analysis: laboratory work: Fresenius. (2) The following analyses are executed by the student:

12. Slag (complete analysis).
13. Pig iron (complete analysis).
14. Carbon in steel (volumetric).
15. Nickel ore (Ni, Co).
16. Gas analysis.

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Mining.—Mechanical preparation of ores. Coal washing. Lectures. (2)

Metallurgy.—Of copper, lead, silver, gold, &c. (4)

Drawing.—Designing of furnaces and other metallurgical plant. (2)

Mechanics of Machinery. — Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

Gymnasium.

GRADUATE YEAR.

FIRST TERM.

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Geology.—General geological definitions and principles. Dynamic geology. Dana. (2)

Drawing.—General views of mining plant and detailed sketches. (3)

Astronomy.—Descriptive Astronomy. (3)

Topographic Surveying.—Field work, with transit and stadia, and with plane table. Topographical maps. (3)

Mine Surveying.—Theory and problems. (1)

SECOND TERM.

Geology.—Historic geology. Dana. (2)

Projects.—In geology and mining. Designing of mining plant. (3)

Mining.—Prospecting. Economic geology. Boring. Valuation of property. Methods of mining. Lectures. (3)

Mine Surveying.—Practice, with construction of mine maps. (1)

Geological Surveying.—Theory, practice, and map-drawing. (1)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Astronomy.—Practical Astronomy; observatory work. (2)

Preparation of Thesis.

THE COURSE IN MINING.

This course is so designed that the student who desires to pursue the practice of mining and ore-dressing, may be prepared for practice in four years, receiving the degree of Bachelor of Science in Mining (B.S.).

For such students as may take the surveying of second term sophomore year in the summer school at the end of freshman year, or that of first term junior year at the end of sophomore year, or both, advanced work will be provided in such subjects as may be agreed upon by the student and the professor in charge of the department; and all graduates from this course can obtain the degree of E.M., by one year of post-graduate work.

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

Drawing.—Tracings and blue prints. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., illustrated from examples of mining and metallurgical plant. (4)

German.—Grammar and reader (continued). Short stories by different modern authors. (3) Or *French.*—Grammar and reader (continued). (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Drawing.—Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Graphical problems illustrating the direction and extent of throw in faults. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

German.—Advanced Grammar. Short stories by different modern authors. (2) Or *French.*—Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Land Surveying.—Theory and use of level and transit. Field practice and map-drawing. (2)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2) Or *French.*—Advanced Grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Drawing.—Mining construction. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Geology.—General geological definitions and principles. Dynamic geology. Dana. (2)

Lithology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographical maps. (4)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Or *French.*—Corneille, Racine, Molière, Hugo, etc. Dictation. Compositions. (2) Conversation class in both languages optional throughout the year.

English.—English and American orators. (1)

SECOND TERM.

Geology.—Historic geology. Lectures. Dana. (2)

Mining.—Prospecting. Economic geology. Boring. Valuation of property. Timbering and walling. Support of excavations. Tunneling. Systems of mining. Lectures. (3)

Steam Engine.—Holmes' Steam Engine. (4)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

German or French.—Readings. Compositions. Lectures on German or French literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Drawing.—Mining design. (3)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (2)

Assaying.—Including the assay by the dry methods of gold, silver, antimony, lead, iron, and tin ores, coal, and gold and silver bullion. Laboratory work. Ricketts. (3)

Mechanics of Machinery.—Herrman-Smith. The graphical statics of mechanisms. (2)

Mine Surveying.—Theory, with problems in tunneling, shaft location, and survey of bore-holes. (1)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Mining.—Mechanical preparation of ores. Coal washing. (2)

Projects.—In mining. Designing of mining plant. (3)

Mechanics of Machinery.—Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Mine Surveying.—Practice, with construction of mine maps. (1)

Geological Surveying.—Theory, practice, and map contruction. (1)

Hydráulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

Gymnasium.

THE COURSE IN ELECTRICAL ENGINEERING.

The special technical studies of the course may be grouped under the following heads: Physics Laboratory, Principles of Electricity and Magnetism, Electrical Laboratory, Alternating Currents, Dynamo-Electric Machinery, Dynamo Laboratory, Dynamo Design, and the Applications of Electricity.

The work in the Physics Laboratory extends throughout the Sophomore year, and consists of quantitative experiments in mechanics, heat, light, and sound.

The principles of Electricity and Magnetism are studied by means of an experimental course in the Sophomore year, followed in the Junior year by a course on their practical application and a study of the system of electrical units, symbols, and abbreviations.

The work in the Laboratory of Electrical Measurement extends throughout the Junior year, and may be classified as follows: measurement of ordinary resistances, of low resistances, of insulation resistances; determination of the capacity of condensers, of the electromotive force and

resistance of batteries, of the coëfficient of self-induction of a circuit: determination of the horizontal component of the earth's magnetism, the specific resistance and temperature coëfficients of wires, and the magnetic qualities of iron and steel. To this is added the design and construction of some piece of electrical apparatus.

The principles of Alternating Currents are studied during the second term of the Junior year, after the student has acquired a knowledge of differential equations, and before he takes up the study of alternating current machinery. The subject is studied both analytically and graphically.

The study of Dynamo-Electric Machinery extends throughout the three last terms of the course, and falls into the three natural divisions of direct-current generators and motors, alternating-current generators, motors, and transformers, and polyphase machinery.

The work in the Dynamo Laboratory extends throughout the Senior year, and consists of a full course in the handling and testing of dynamos, motors, transformers, storage batteries, circuits, instruments, etc.

The work in the Designing Room extends throughout the Senior year, and consists of the design of several types of machine, and the complete design in all its details of a multipolar generator.

The Applications of Electricity are studied throughout the last three terms of the course: telephony and telegraphy in the second term of the Junior year, electric lighting in the first term and electric power in the second term of the Senior year. In each case the instruction in the classroom is supplemented by visits to stations and factories. These visits are considered part of the class work, and each member of the class is required to hand in a report.

The technical studies pursued in other departments of the University are as follows: in the department of Mechanical Engineering, Machine Design, Steam Engine, Boilers, Graphical Statics of Mechanisms, Thermodynamics, and the Measurement of Power; in the department

of Civil Engineering, Freehand Drawing, Strength of Materials, Surveying, and Hydraulics; in the department of Mineralogy and Metallurgy, Electrometallurgy.

Beginning with the summer of 1898, students taking the Course in Electrical Engineering will be required to take the work in Surveying included in that course at the Summer School (see page 97). The time heretofore given to that subject will thus be made available for instruction in other subjects, and the course hereby extended and enriched.

A deposit of $10 for the year is required from each student before he is allowed to work in any of the laboratories. From this deposit, at the end of the year, is deducted the cost of any materials wasted or apparatus injured by him during the year.

The student who completes all the studies of this course will receive the degree of Electrical Engineer (E. E.).

For the benefit of graduates in Electrical Engineering who desire to study the advanced portions of electrical science, instruction is offered in the mathematical theory of electricity and magnetism, space analysis, and mathematical physics in general.

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (3)

German.—Grammar and reader (continued). Short stories by different modern authors. (3) Or *French.*—Grammar and reader (continued). (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Mechanics, heat, and light. Lectures. (2) Physical laboratory. (2)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers, and connecting rods. (2)

Electricity and Magnetism.—An experimental course in the principles of the science. (2)

German—Advanced Grammar. Short stories by different modern authors. (2) Or *French.*—Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Steam Engine.—Holmes' Steam Engine. (4)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Physical laboratory. (1)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2) Or *French.*—Advanced Grammar. Short stories by François Coppée and Guy de Maupaussant. Vigny: Le Cachet Rouge. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Hyperbolic trigonometry, theory of errors and least squares. (2)

Electricity.—Advanced course in the principles of electricity and magnetism. (3)

Units.—Lectures and exercises on the system of electric and magnetic units. (1)

Electrical Laboratory.—Course in electrical measurements. Text-book: Holman's Electrical Measurements. Books of reference: Nichols's Junior Course, Fleming's Notes and Forms, Stewart & Gee's Practical Physics, Ewing's Magnetism of Iron, Macfarlane's Mathematical Tables. (3)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Boilers.—Wilson. Strength, construction, and wear and tear of boilers. (1)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Or *French.*—Corneille, Racine, Molière, Hugo, etc. Dictation. Compositions. (2) Conversation class in both languages optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Dynamo-electric Machinery.—Direct-current generators and motors. Text-book: Thompson's Dynamo-electric Machinery. (3)

Alternating Currents.—The analytical and graphical treatment of alternating currents. (3)

Electrical Laboratory.—Continuation of course in electrical measurements. (3)

Telegraphs and Telephones.—Lectures. (3)

Surveying.—Theory and use of instruments. Land surveying and leveling. Location of electric railways. (2)

German or French.—Readings. Compositions. Lectures on German or French literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Dynamo-electric Machinery.—Alternators and transformers. (2)

Dynamo Design.—Lectures. (1) Draughting. (2)

Electric Lighting.—Lectures. (2)

Dynamo Laboratory. (3) Text-book recommended: Nichols's Senior Course.

Measurement of Power.—Indicating of steam engines and dynamometer experiments. (1)

Mechanics of Machinery.—Herrmann-Smith. The graphical statics of mechanisms. (2)

Thermodynamics. (3)

Station Visits.

SECOND TERM.

Dynamo-electric Machinery.—Polyphase apparatus. (2)

Dynamo Design.—Lectures. (1) Draughting. (2)

Dynamo Laboratory. (3)

Electro-metallurgy.—Lectures. (1)

Electric Power.—Lectures. (2)

Station Visits.

Hydraulics.—Flow of water through orifices, pipes, and channels. Hydraulic motors. (3)

Christian Evidences. (1)

Preparation of Thesis.

THE COURSE IN CHEMISTRY.

This course of study is designed to prepare students for the profession of the chemist, in connection with metallurgical establishments, sugar refineries, gas works, superphosphate works, electrical machinery manufactories,

mining companies, etc., and the general consulting and analytical work of the professional chemist. It is also well adapted to the preparation of teachers of chemistry and as a course preliminary to the study of medicine. It is eminently practical, the student's time being largely occupied by practical work in the large, well equipped and well ventilated chemical laboratories, which were completed in 1885 and constitute the best constructed building for this purpose in this country. The museum of chemistry contains large collections of specimens, for illustrating the lectures on theoretical and applied chemistry.

THEORETICAL CHEMISTRY.—Instruction in this subject begins with lectures three times a week, in the first term of the Freshman year. These lectures are fully illustrated by experiments, colored diagrams, working drawings and lantern pictures, and specimens from the museum. They include a general introduction to theoretical chemistry, and a description of the non-metallic and metallic elements and their compounds, the general subject of inorganic chemistry. The students are required to take notes of the lectures, and to pass a written examination at the end of the term.

In the second term of this year stoichiometry and chemical problems and reactions are taught by recitations twice each week.

The study of theoretical chemistry is continued throughout the Sophomore year by recitations three times a week from Tilden's Chemical Philosophy, Whiteley's Chemical Calculations, and Remsen's Chemistry; in the first term of the Junior year, by a course of lectures and recitations on theoretical organic chemistry, four times a week. These lectures are illustrated by experiments and by specimens from the museum of chemistry.

Written examinations are held at the close of each of the above courses.

ANALYTICAL CHEMISTRY.—Qualitative analysis is taught in the second term of the Freshman year, by lectures,

recitations, and practical work in the qualitative laboratory, fifteen hours of practical work per week being required. This laboratory is a large, well ventilated, and well lighted room, supplied with convenient working tables, vacuum filtration, hoods for noxious vapors, steam baths, gas and washing appliances, and a commodious room for hydrosulphuric acid. Distilled water is delivered by faucet in this room and the other large laboratories. At the close of the term a practical examination is held in this subject.

After completing this course, quantitative analysis is pursued throughout the Sophomore and the first term of the Junior years. This subject is taught by lectures, recitations, and practical work in the quantitative laboratory, which is equipped like the qualitative laboratory, but is supplied in addition with apparatus for drying precipitates and residues, rooms for the chemical balances, for combustions, and for a reference library.

Fifteen hours per week of laboratory work are required.

The course consists in gravimetric and volumetric analyses, as applied to the substances given in the lists farther on, accuracy being required in the determination of each constituent.

At the close of each term written examinations are held upon the theory and practice of quantitative analysis.

Gas Analysis is taught by lectures and laboratory practice in the gas laboratory. This laboratory is supplied with full and complete apparatus for gas analysis, according to Bunsen's processes, as well as apparatus for some of the more rapid methods. Mixtures of gases are required to be analyzed by the students, within certain limits of error, and a written examination, on the theory and practice, is held at the close of the course.

Assaying.—The assaying of ores by furnace assay, together with gold and silver bullion analysis, by processes practiced in the United States Mint, is taught by lectures and practical work in the first term of the Senior year,

nine hours of practical work per week being required. The course includes the assaying of ores of lead, tin, antimony, gold, silver, and iron, coal, and gold and silver bullion.

The assaying laboratory is supplied with large working tables, twenty-nine crucible and two iron furnaces, and eight muffle furnaces, with adjoining rooms for balances, and gold and silver bullion analysis.

A certain accuracy of results and a written examination as regards theory and practice are required.

ORGANIC CHEMISTRY.—The practical work in this subject is performed in the second term of the Junior year, eighteen hours per week being required, with conferences and recitations each week. The laboratory for this work is equipped similarly to the quantitative laboratory, in addition being supplied with steam, cold water and air blast upon the working tables, and a full supply of apparatus for the various determinations and experiments, including combustion furnaces, furnaces for heating sealed tubes, mercury pump, Hoffman's, Dumas' and Meyers' apparatus for vapor densities, nitrometers, chemical balances, etc.

The course consists of determinations of specific gravities, melting points, boiling points, vapor densities; chlorine, bromine, iodine, and sulphur of organic substances.

Combustion analysis, nitrogen determination, fractional distillation, and the preparation of fifty pure organic compounds and a number of analyses are included.

INDUSTRIAL CHEMISTRY.—A course of lectures is delivered upon this subject in the second term of the Senior year, illustrated by experiments, diagrams, lantern pictures, and specimens from the museum of chemistry. The working laboratories for this subject contain an apparatus for making illuminating gas, an alcohol still, worm and doubler, and a complete working model of a sugar refinery, including filters, vacuum pan, and centrifugal. There is also apparatus for use in the manufacture of chemicals, for dyeing, calico printing, and bleaching. In connection with these laboratories is a room containing a photometer

and apparatus for determining the sulphur, ammonia, and specific gravity of illuminating gas; also a laboratory for the testing of alcoholic liquors, sugar, molasses, bone black, soap, petroleum, paints, dyes, superphosphates, tallow, illuminating and lubricating oils, rubber, explosives, paints, asphalts, and other commercial products, with the necessary technical apparatus. The students make practical experiments in this direction, and, with an instructor, visit various industrial establishments in this neighborhood and in and around New York City. Fifteen hours of laboratory work are required each week throughout the Senior year.

TOXICOLOGY.—A course of lectures on this subject is given in the first term of the Junior year, illustrated by experiments and by the large collection of specimens of poisons from the museum of chemistry. This is supplemented by a short course of laboratory work on some of the common poisons.

SANITARY CHEMISTRY.—During the second term of the Senior year attention is given to the qualitative and quantitative examination of air, water, food, disinfectants, baking-powders, flour, bread, tea, coffee, cocoa, spices, milk, butter, lard, beer, and other subjects connected with this branch of the science. Special apparatus is provided for this work, as recommended by the best authorities on the subject.

PHOTOGRAPHIC CHEMISTRY.—A well equipped photographic laboratory and dark rooms are provided, in which the students of the chemical course receive practical instruction.

PHYSIOLOGICAL CHEMISTRY.—The examination of urine, blood, organic and inorganic poisons, etc., receives a proper amount of attention.

The course also includes instruction in physics, mineralogy, blowpipe analysis, metallurgy, and geology, which are of great value to the chemist.

MICROSCOPY.—Instruction in the use of the microscope is given in the first term of the Senior year, six hours of laboratory work each week being required.

In the Senior year the student is required to prepare a thesis on some subject, selected by the Professor of Chemistry, involving practical work in the laboratory in addition to the literary labor, each graduate thus making a contribution to the progress of the science, as a preliminary to the reception of his degree.

The graduate of this course receives the degree of Analytical Chemist (A.C.).

Students, not candidates for a degree, are admitted to special courses in chemistry, of which they will receive certificates.

The laboratories are under the immediate charge of the Professor and Instructors of Chemistry and are open to the students from 8 o'clock A.M. to 6 o'clock P.M., including Saturdays. Students are at liberty to work in the laboratories beyond the required hours as their time may permit. Students are charged for materials and apparatus consumed; with moderate care this expense need not exceed $50 per year.

FRESHMAN CLASS.

FIRST TERM.

See page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Stoichiometry. (2)

German.—Grammar and Reader (continued). Short stories by different modern authors. (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Chemical Philosophy. — Tilden. Chemical calculations. Whiteley. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium dichromate (Cr_2O_3).
3. Barium chloride (Ba, Cl, H_2O).
4. Magnesium sulphate (MgO, SO_3, H_2O).
5. Disodium hydrogen phosphate (P_2O_5).
6. Rochelle salt (K_2O, Na_2O).
7. Volumetric determination of chlorine.
8. Acidimetry (HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$).
9. Alkalimetry (KOH, NaOH, NH_4OH, soda ash, pearl ash).
10. Chlorimetry (bleaching powders).

Quantitative Analysis.—Conference. (1)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

German.—Advanced Grammar. Short stories by different modern authors. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5) The following analyses are executed by the student:

11. Copper ore (Cu).
12. Zinc ore (Zn). By both gravimetric and volumetric methods.
13. Lead ore (Pb, S).
14. Silver coin (Au, Pb, Ag, Cu).
15. Spiegeleisen (Mn).
16. Copper alloys (complete analysis).
17. Ilmenite (TiO_2).

18. Iron ore (complete analysis).
19. Limestone (complete analysis).
20. Coal (volatile matter, fixed carbon, ash, H_2O, S, P).
21. Slag (complete analysis).

Quantitative Analysis.—Conference. (1)

Chemistry.—Remsen. Advanced course. (3)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Toxicology.—Lectures. (2)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the student:

22. Guano (NH_3, P_2O_5, H_2O).
23. Clay (complete analysis).
24. Manganese ore (MnO_2).
25. Mineral water (complete analysis).
26. Pig iron (complete analysis).
27. Nickel ore (Ni, Co).
28. Carbon in steel (volumetric).
29. Gas analysis.

Quantitative Analysis.—Conference. (1)

Organic Chemistry.—Lectures and recitations. (4)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Conversation class optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Organic Chemistry.—Laboratory. (6)

Organic Chemistry.—Conference. (1)

Metallurgy.—Of copper, lead, silver, gold, etc. (5)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

German.—Readings. Compositions. Lectures on German literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (4)

Assaying.—Including the assay by the dry method of gold, silver, antimony, lead, iron, and tin ores, coal, gold and silver bullion, and rich lead. Ricketts. (3)

Industrial Chemistry.—Laboratory. (3)

Geology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Microscopy.—Laboratory. (2).

Blow-Pipe Analysis.—Practice. (1)

Preparation of Thesis.

SECOND TERM.

Industrial Chemistry.—Lectures. (3)

Industrial Chemistry.—Laboratory. (3)

Industrial Chemistry.—Conference. (1)

Agricultural Chemistry.—Laboratory. (1)

Sanitary Chemistry.—Laboratory. (1)

Geology.—Historic and dynamic geology. Lectures. LeConte. (3)

Christian Evidences.—Lectures. (1)

Preparation of Thesis. (4)

THE COURSE IN ARCHITECTURE.

The studies in this course are closely allied with those in civil engineering, the higher surveying, railroad work, mineralogy, geology, and astronomy being omitted; instead of which architectural designing is substituted, as seen in the following program. Instruction is also given in the history and æsthetics of architecture, in methods of heating and ventilating, in boilers and hoisting machinery, and in house drainage and sewerage.

During the first and second years the student lays the foundation for his professional work by the study of mathematics, physics, mechanics, drawing, surveying, English, and French or German. The course in drawing includes the use of water colors, free-hand, projection and isometric drawing, and their application to the general plans for masonry structures. In surveying there is field practice in the use of instruments, and also map drawing, thus enabling the student to understand the application of the subject to landscape gardening, and to the location of buildings.

During the third and fourth years of the course the work is of a more professional character. The subject of construction familiarizes the student with brick, stone, cement, and other materials, with foundations and masonry, with arches, piers, and walls, and with the stone-cutter's art. There is a full course in the theory and calculation of columns, beams, and shafts, in the strength of materials and its application to roof trusses and bridges. Working drawings of arches, piers, and roof trusses are made in detail. Plans and estimates are prepared for wooden, brick, stone, and iron buildings, the work being done according to standard specifications. In connection with the course visits of inspection are made to engineering structures in the Lehigh Valley and vicinity.

The student who completes all the subjects of this course will receive the degree of Bachelor of Science in Architecture (B. S.).

FRESHMAN CLASS.

FIRST TERM.

See Page 50.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Construction.—Materials. Masonry. Carpentry. Roads and pavements. Sketches of structures. (2)

Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)

German. — Grammar and Reader (continued). Short stories by different modern authors. (3) Or *French.*—Grammar and Reader (continued). (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Differential and integral calculus. (3)

Mechanics.—Theory of motion, statics, energy, center of gravity, moment of inertia, and general equations of motion. (2)

Physics.—Heat, magnetism, and electricity. Lectures, with study of text-book. (2) Physical laboratory. (1) Electrical laboratory. (1)

Architectural Drawing.—Plans of piers and arches. Problems in stone cutting. Use of water colors. (3)

German.—Advanced Grammar. Short stories by different modern authors. (2) Or *French.*—Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2)

English.—American literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus. Differential equations. (4)

Mechanics.—Work of first term continued. (2)

Physics.—Heat, magnetism, electricity, and light. Lectures. (2) Laboratory. (1)

Surveying.—Theory and use of compass, level, and transit. Surveys and maps of farms. Leveling. (4)

German.—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staat Friedrichs des Grossen. Dictation. (2) Or *French.*—Advanced Grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Hyperbolic trigonometry, theory of errors and least squares. (2)

Strength of Materials. — Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Construction.—Foundations, arches, dams, walls, and bridges. Visits of inspection. (3)

Perspective Drawing.—Shades, shadows, and linear perspective. Pen and ink rendering. (4)

German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Dictation. Compositions. (2) Or *French.* — Corneille, Racine, Molière, Hugo, etc. Dictation. Compositions. (2) Conversation class in both languages optional throughout the year.

English.—English and American Orators. (1)

SECOND TERM.

Roofs and Bridges. — Theory and calculation of stresses in roof and bridge trusses. (5)

Sanitary Engineering. — Collection, purification, and distribution of water. Systems of water supply and sewerage. Drainage and sewerage of buildings. (2)

Architecture.—Designs and estimates for brick and stone buildings. (4)

History.—The history and styles of architecture. (2) Lectures on Roman antiquities. (1)

German or French.—Readings. Compositions. Lectures on German or French literature. (1) Technical readings. (1)

English.—British Essayists. (1)

SENIOR YEAR.

FIRST TERM.

Roofs and Bridges.—Graphic statics. Designs for plate girders, riveted and pin-connected roof trusses, with working drawings. (7)

Mechanics of Machinery.—Pile drivers, cranes, and elevators. (2)

Boilers.—Strength, construction, and wear and tear of boilers. Wilson. (1)

Architecture.—Specifications and estimates. Design for an iron building. (4)

Heating and Ventilation.—Systems of heating, lighting, and ventilating buildings. (2)

SECOND TERM.

Hydraulics.—Efflux of water from orifices, and flow in pipes and channels. Hydraulic motors. (3)

Roofs and Bridges.—Theory of cantilever, draw, continuous, and arched structures. (3)

Architecture.—Building superintendence. The æsthetics of architecture. Plans, specifications. (6)

Christian Evidences.—Lectures. (1)

Preparation of Thesis. (3)

PHYSICAL CULTURE.

The Gymnasium is open morning, afternoon, and evening; in all, 45 hours a week. Exercise in it is required of all students who are fitted to take it. Class drill with the Instructor and individual exercise are prescribed.

GRADUATING THESES.

Every student is required to present a thesis upon some topic connected with his special course, as a necessary portion of the exercises for his final examination for a diploma. These theses are accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the Secretary of the Board of Trustees and by the Faculty of the University. For all the partial courses a certificate is given, signed by the Secretary of the Faculty, and showing what the student has accomplished.

GRADUATE STUDENTS.

Graduate students wishing to remain a year or more and pursue a course of study as candidates for another Degree may do so with the sanction of the Faculty. Those wishing to take *special* courses of study will be afforded every facility for so doing.

GRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts any candidate, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue, for at least one year at this University, or two years elsewhere, a course of liberal study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same, and present a satisfactory Thesis.

M. S.

The Faculty will recommend for the Degree of Master of Science any candidate, otherwise properly qualified, who, after taking at this University any Degree in the School of Technology, shall pursue, for at least one year at this University, a course of study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same and present a satisfactory Thesis. Graduates of the Latin-Scientific Course, or of that of Science and Letters, are permitted to study *in absentia* for the degree of M.S., subject to the same restrictions as those prescribed for candidates for the degree of M.A.

The Theses presented by candidates for Graduate Degrees shall be retained by the University.

Applicants for either of these degrees will be required to complete the prescribed work within the allotted time. Special action of the Faculty is required for any extension of time.

THE UNIVERSITY LIBRARY.

The Library building was erected by the Founder of the University in 1877, at a cost of $100,000, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than $20,000 were contributed by her family and friends as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the center is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for one hundred and sixty thousand volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Ninety-seven thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about two hundred and fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A.M. until 10 P.M., and on Sundays for the students and others connected with the University from 1:30 P.M. until 9:30 P.M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.

IV. The University Professors and Instructors, only, are allowed to take books from the Library Building.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pen and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulation will be denied the privilege of the Library.

X. Any person who defaces, in any way, any book magazine or paper, or the furniture, or a

tion of the building, in addition to being deprived of the privileges of the Library will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an astronomical observatory was erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an equatorial telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior sidereal clock, by Wm. Bond & Sons; a zenith telescope, by Blunt, and a field transit, by Stackpole. There is also a prismatic sextant, by Pistor & Martins.

Students in practical astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the Observatory stands, consisting of seven acres of land adjoining the original grant, were presented to the University by Charles Brodhead, Esq., of Bethlehem.

THE UNIVERSITY MUSEUM.

In addition to the large collection illustrating all branches of Industrial Chemistry, the Museum includes collections in Metallurgy, Geology, Zoölogy, and Archæology.

The Metallurgical Cabinet already includes specimens illustrating the various processes for obtaining the more common metals.

The Zoölogical Cabinet includes the Werner collection of nearly all the types of American birds with their nests and eggs, and the Packer collection of recent shells.

The Geological Cabinet numbers over ten thousand specimens and includes the Palæontological, Mineralogical, Petrographic, and Economic collections. The first contains good specimens of nearly all the common genera. The Mineralogical division includes the Keim and Rœpper col-

lections—the latter being especially complete and valuable from a crystallographic standpoint. The Petrographic division numbers several thousand specimens and, besides including numerous varieties of nearly all the rocks of the globe, contains a duplicate set from the collection of the Second Geological Survey of this State. The Economic division was formed and given by Dr. James P. Kimball, ex-Director of the Mint, and formerly Professor of Economic Geology.

The Cummings Archæological Cabinet numbers three thousand specimens and includes Dr. Stubbs' collection of Indian relics, weapons, and utensils.

SUMMER SCHOOL OF SURVEYING.

A Summer School of Surveying, extending over a period of three or four weeks, is held at the University during the long vacation. In 1897 the school will open on Monday, June 21, at 8:30 A.M. Applications to join it should be made to the Professor of Civil Engineering before June 1, 1897. The tuition fee is $15, payable in advance.

Three courses in Surveying are offered in the Summer School:

A. Land and Town Surveying: corresponding to the course given to civil engineering students in the second term of the Sophomore year. This course is open to any student who has completed the Freshman year, or to any person having a good knowledge of geometry and trigonometry.

B. Topographical Surveying: corresponding to the course given to civil engineering students in the first term of the Junior year. This course is open to those who have completed course *A* or its equivalent.

C. Geodetic Surveying: corresponding to the course given to civil engineering students in the first term of the Senior year. This is open to those who have completed courses *A* and *B*.

At the close of the Summer School examinations are held and certificates given. Students of the University holding these certificates may omit the corresponding work in Surveying during the academic year and may, with the sanction of the Faculty, use the time thus gained in extra studies.

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of botanical and zoölogical specimens belonging to the Society are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

THE ENGINEERING SOCIETY.

This Society was organized in 1873, and admits, by election, students in the Junior and Senior Classes. Its meetings are held fortnightly. At these, papers relating to engineering subjects are read and discussed. From 1885 to 1890 it issued quarterly five volumes of "The Journal of the Engineering Society," containing contributions by the members, alumni, and others. Many of the papers read before this society since 1890 have been published in "The Lehigh Quarterly."

THE MINING CLUB.

This was organized in 1883 and takes from the Junior, Senior, and Graduate Classes those members of the Mining School who excel in their studies or in practical experience in the subjects of the course.

THE ELECTRICAL ENGINEERING SOCIETY

was organized in November, 1887, by students in the Advanced Course in Electricity. Its object is to supplement the regular work of the department by the study and discussion of electrical subjects.

THE AGORA

is a literary and debating society which meets semi-monthly. Once restricted in its membership to students in the School of General Literature, in 1893 it was thrown open to all students. It has proved of great advantage to its members in the development of concise and logical thinking, the promotion of ease before an audience, and the acquirement of experience in parliamentary methods. The society has recently joined the Inter-collegiate Debating Union, and it is expected that this will increase the interest already existing, and at the same time enlarge the knowledge of current affairs by the discussion of those subjects of the day which are prescribed by the Union.

THE CLASSICAL CLUB.

This organization was founded in the Spring of 1889, and consists of the students in the Classical and Latin-Scientific Courses, together with those members of the Faculty who are interested in this department of learning. At its monthly meetings, papers upon philological, historical, and archæological subjects are read by students belonging to the upper classes, and are then discussed and criticised. Thus independent work is encouraged and correct methods of investigation are acquired. This is especially valuable for those men who purpose becoming teachers or original investigators. Reports upon new discoveries and reviews of recent books vary the proceedings and keep the members informed in regard to the advances of philological science.

THE NATURAL SCIENCE CLUB OF THE LEHIGH UNIVERSITY.

The object of this organization is systematic study, in connection with field work, in natural history and its associated subjects. Its members are engaged in making a survey, both botanical and mineralogical, of the region within a radius of five miles from the University and propose to collect an herbarium and mineralogical cabinet which shall contain specimens of all the plants and minerals within this district.

THE ARCHITECTURAL CLUB.

This club was formed for the purpose of collecting photographic plates of buildings and plans, and to distribute prints of these among its members. Working drawings, models, and specimens of building materials have also been collected. During the past year a series of monthly competitions in pen and ink drawings was held. The active members of the club are students in the architectural and engineering courses.

THE MATHEMATICAL CLUB.

This club was organized in February, 1895. Its members are students in the Junior and Senior classes. Its object is to continue the study of higher mathematics after having completed the mathematical course of the University.

THE LEHIGH UNIVERSITY CHRISTIAN ASSOCIATION.

This is a voluntary organization of the students for the promotion of the religious, moral, and social life of the University. It was organized April 18, 1890, and on Oct. 11, 1890, united itself with the Intercollegiate Young Men's Christian Association. The movement is distinctly for and by students, all the officers being chosen from the student-body. Those connected with Evangelical churches of whatever creed are eligible to *active membership; associate membership* may be claimed by men of good moral standing

who are not members of churches. The association is continually growing, and is extending a marked influence for good among the men.

THE BIBLE CLASS.

A class for the reverent study of the sacred Scriptures, under the direction of the Chaplain, meets every Sunday afternoon at half past three o'clock. This class aims at both practical and theoretical results—the edification of its members in the Word of God, and the application of the "scientific" or "historical" method to the study of Holy Writ.

FOUNDER'S DAY.

On the second Thursday of October of each year, Commemorative Exercises are held in honor of the Founder of the University. On Thursday, October 8, 1896, the seventeenth Founder's Day was celebrated. An address was delivered by Mr. John H. Converse, of Philadelphia. His subject was "Citizenship and Technical Education."

UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rev. William B. Bodine, D.D., of Philadelphia, was the preacher on Sunday, June 15, 1896, in the Packer Memorial Church.

THESES.

Theses on the following subjects were prepared by candidates for degrees in 1896:

FOR THE DEGREE OF PH. D.

"A Study of some Derivatives of Meta-Diazo-Benzene-Sulphonic Acid, and Action of certain Alcohols on Asym. Meta-Diazo-Xylene-Sulphonic Acid."

HERMAN EUGENE KIEFER, A.C., M.S.

FOR THE DEGREE OF E.M.

"A Test of the Efficiency of the Blowing Engines in Use by the Crane Iron Co., Catasauqua, Pa."

WILLIAM HENRY BROWN, B.S. (in Mining),
ARTHUR HUGHES LEWIS, B.S. (in Mining).

"The Detwiller Peat Deposit."

JOHN THOMAS CALLAGHAN, JR., B.S. (in Metallurgy).

"A Review of Methods of Working Marbles."

HOWARD ECKFELDT, B.S. (in Metallurgy).

"Investigation of the Taylor Gas Producers at the Works of the Lehigh Zinc and Iron Co., South Bethlehem, Pa."

ALBERT BEARDSLEY JESSUP, B.S. (in Mining),
CARLOS YGLESIAS, B.S. (in Mining).

"A Comparison of Glaciated and Non-glaciated Coal Outcrops."

JOSEPH PHILIPS, JR., B.S. (in Metallurgy).

FOR THE DEGREE OF B.A.

"The Roman Senate."

WARREN JOSHUA BIEBER.

"Municipalities: Their Nature, Government, and Present Issues."

ROBERT EDWARD LARAMY.

"The Conditions of Roman Literature under Augustus and Tiberius."

JOSEPH WHARTON THURSTON.

FOR THE DEGREE OF B.S.

"Nathaniel Hawthorne."

HOWARD FRANKLIN BOYER.

FOR THE DEGREE OF C.E.

"Flood Protection for Williamsport, Pa."

ALBERT DOANE AYERS.

"Frogs and Switches within two miles of Bethlehem from a mechanical point of view."

LEWIS WARRINGTON BALDWIN.

"A System of Interlocking Switches and Signals."

SPRINGFIELD BALDWIN.

"Plans and Specifications for an Electric Railway from South Bethlehem to Hellertown."

FREDERICK BARTLES.

"A Treatment of Calculus free from the doubts that usually attend it."

FAIRFAX BAYARD.

"The Cremation and Reduction of Garbage in Pennsylvania and New Jersey."

MORIZ BERNSTEIN.

"Comparison of Formulas for the Strength of Columns."

DANIEL WILLIAM BLIEM.

"Investigation of Coal Storage Trimmers at South Plainfield, N.J."

EDWARD ELISHA BRATTON.

"The Strength and Economy of several kinds of Metal Piles."

FREDERIC ALLYN DABOLL.

"Design for a Viaduct from Fountain Hill to New Union Station, South Bethlehem, Pa."

FRANK OLIVER DUFOUR.

"Plans and Specifications for an Electric Railway from Bethlehem to Freemansburg."

EDWARD MIALL DURHAM, JR.

"A Steel Mill Building."

GEORGE RAMSEY ENSCOE.

"A Review of the Lancaster Reservoir."

HENRY NEFF HERR.

"Design for a new Gravity Water Supply for Blairstown, N.J."

ROBERT PARSONS HOWELL.

"Investigation of the new Arched Bridge at Niagara Falls, N.Y."

VICTOR WITMER KLINE.

"Frogs and Switches within two miles of Bethlehem from a location point of view."

JOHN BUCKLEY MCBRIDE.

"Design for a Bridge over the Lehigh River at South Bethlehem, Pa."

JOHN HENRY MYERS.

"A Sanitary Survey of the Lehigh Valley."

WALTER RALEIGH OKESON.

"History of the Measurement of the Peruvian Arc."

HORACE LUCIUS PALMER.

"Observations and Discussions of Solar Azimuths."

HOMER AUSTIN REID.

"Investigation of the Tuolumne Dam in California."

GEORGE HOMER RUGGLES.

"History of Bridges over the Lehigh River between Easton and Mauch Chunk."

CLEMENT CLARENCE RUTTER.

"Review of the Water Supply of Allentown, Pa."

JOHN CORNELIUS SESSER.

"Investigation of the Cross Section of the Quaker Bridge Dam."

LUTHER D. SHOWALTER.

"The Flow of Water through Riveted Pipes."

ULYSSES GRANT S. WALTERS.

"Saucon Springs as a Water Supply for South Bethlehem, Pa."

FRANK THOMAS WEILER.

FOR THE DEGREE OF M.E.

"A Device for Regulating the Tension on the Feed-Spool of a Rope Twisting Machine."

WILLIAM STEWART AYARS.

"The Design of a Folder for a Web Press."

HOBART BENTLEY AYERS.

"Determination of the Running Balance of Wing's High Speed, Three-Cylinder, Oscillating Engine."

HASELL WILSON BALDWIN.

"A Test to find the Efficiency of a Turbine at Full and Partial Gate Opening."

FRANK SHEPARD BROMER.

"Determination of the Action of a Governor during a Change of Load."

GEORGE AMANDUS BUVINGER,
HOWARD DRYSDALE HESS.

"Mechanical Stoking versus Hand Firing."

ECKLEY SAMUEL CUNNINGHAM.

"Exact Measurements and their Application to Machine Shop Practice."

SAMUEL PHILIP CURTIS.

"A Comparison of Economics of Steam and Electricity as applied to Railway Transportation."

JOHN WILLIAM DALMAN.

"The Modern Freight Car."

WILLIAM CARTER DICKERMAN.

"The Production of Compressed Air: Theory and Practice."

EDWARD HIRAM DUTCHER, JR.

"Determination of the Coëfficient of Discharge and Efficiency of the Crowell Six-Pound Blower."

CHARLES VICTOR FERRIDAY.

"Tests and Discussion of the Performance of a Korting Compound Steam Injector."

THOMAS JOSEPH GANNON.

"Production of Samples of Wet Steam and Determination of their Moisture by the Throttling Calorimeter."

WILLIAM HEALD GROVERMAN.

"The Net and Gross Amount of Power required to run a Bolt and Nut Factory."

CALEB WHEELER LORD.

"Irrigation of Land by Pumping Machinery."

RAFAEL DE LA MORA.

"Mechanical Equivalents in Inventions."

MORRIS WRIGHT POOL.

"The Use and Production of Superheated Steam."

JAMES LEE RANKIN, JR.,
HENRY SHRIVER, JR.

"Report on the 'Pitt Equalizing Engine.'"

ARTHUR YEAGER SHEPHERD.

"Design of a Hydro-electric Plant."

EDWARD STEWART TAYLOR.

"Mechanical Stoking."

HARRY CONKLIN TRIPP.

FOR THE DEGREE OF B.S.

(IN METALLURGY).

"The Utilization of Culm."

GEORGE POMEROY BARTHOLOMEW.

"Investigation of the Working of Blast Furnace No. 4 of the Bethlehem Iron Co."

WILLIAM ALVIN EVANS,
VICTOR ALBERT JOHNSON.

"The Manufacture of Sterling Spelter as practised by the Lehigh Zinc and Iron Company."

EDWARD WILLIAMSON MILLER.

"The Specific Electrical Resistance of Aluminium."

JOHN AUGUSTUS THOMSON.

"The Empire Gold Mill and Pioneer Reduction Works."

EDWARD COPPÉE THURSTON.

"The Manufacture and Tinning of Black Plate."

JOHN SCOFIELD WALLACE.

FOR THE DEGREE OF E.E.

"Test of a Tesla Motor."

WILLIAM JAMES ADAMS,
HENRY PAUL REED.

"Test of a Westinghouse Rotary Transformer."

ARTHUR DAVISON BADGLEY,
FRANKLIN OBERLY.

"Electric Power Equipment of Mills and Factories."

FRANCIS HOSKINS BALDWIN,
JOB ROBERTS WILSON.

"Design of an Incandescent Plant for the Pleasant Valley Mine Company's Buildings."

CHARLES CHAMPLIN WALKER BAUDER.

"Design of an Electric Light Plant for the Borough of Avondale."

AARON BEAUMONT CARPENTER.

"Electric Car Tests."

MALCOLM CARRINGTON,
TIMOTHY SHARPE EDEN.

"Reconstruction of an Arc-Light Dynamo."

FRANK LESLIE COOKE.

"Electric Power Transmission from the Anthracite Coal Fields."

CURTIS BERTRAM FLORY,
WILLIAM STEELL JACKSON.

"Conduit Electric Railways."

CLARENCE RICHARD FOUNTAIN.

"Design and Construction of a Phase-converting Transformer."

JAMES BROWN GIVEN,
CLIFFORD SHERRON MACCALLA.

"Specifications and Cost of South Bethlehem and Hellertown Railroad."

JOHN SAVAGE GRAFF.

"Development of the Electric Locomotive."

DAVID HALL,
CHARLES HOWARD MORGAN.

"Applications of Electricity on the St. Paul."

BRUCE EMERSON LOOMIS.

"The Lamb System of Electric Towage as Applied to Canals."

WILLIAM HITZ MUSSEY.

"Design of South Mountain Electric Railroad."

WILLIAM BAILEY TAILOR.

"Plans and Specifications for an Electric Railroad between Bethlehem and Freemansburg."

CURTIS EDWARDS TRAFTON

"Design of a Power Station."

ALFRED MAHLON WORSTALL.

FOR THE DEGREE OF A. C.

"An Investigation to determine the effect of Oxidizing Agents upon α-Meta-Ethoxy-Sulphonamide."

HERBERT HUEBENER BECK.

"Tanning: its Estimation and Relation to Gallic Acid."

MAXIMILIAN JOSEPH BUCHER.

"The Cane Sugar Industry."

ROBERT EDWIN KRESGE.

"The Manufacture and Chemical Analysis of Champagne."

VICTOR EMANUEL MASSON.

"Russian Mineral Glycerine: its Constants, Composition, and Probable Technology."

LOUIS ATWELL OLNEY.

FOR THE DEGREE OF B. S.

(IN ARCHITECTURE).

"The Ventilation of Modern Residences."

SAMUEL MOSES DESSAUER.

"Design for a Bank Building at Lock Haven, Pa."

JACOB GRAFIUS PETRIKIN.

"Plans for the Main Building of a new Union Depot at South Bethlehem, Pa."

DAVIS SANNO WILLIAMS.

"Plans for the Trainshed of a New Union Depot at South Bethlehem, Pa."

DAVID WILLIAM WILSON, JR.

UNIVERSITY DAY.

This day is the last of the academic year, and falls in 1897 on the third Wednesday in June. On this day orations are delivered by members of the graduating class, and degrees are conferred.

EXERCISES ON JUNE 17, 1896.

Reading of Scripture and Prayer by the Rev. Elwood Worcester, Ph.D., Chaplain of the University.

MUSIC.

Salutatory Oration.—"Citizenship."

ROBERT EDWARD LARAMY.

Oration.—"True Education."

HOBART BENTLEY AYERS.

MUSIC.

Oration.—"America's Place in Mining Science."

EDWARD WILLIAMSON MILLER.

Oration.—"War and Civilization."

HENRY NEFF HERR.

MUSIC.

Oration.—"Applications of Electrical Science."

CHARLES HOWARD MORGAN.

Valedictory Oration.

WARREN JOSHUA BIEBER.

Award of the Wilbur Scholarship to
HAROLD JOHN HORN,
of South Bethlehem, first in rank in the Sophomore Class.

The Wilbur Prizes were awarded as follows:

Freshman Class, Mathematics, to
JOHN WESLEY GRACE, Jr., of Goshen, N. J.
EUGENE GIFFORD GRACE, of Goshen, N. J.

Freshman Class, French, to
G. FRED ALLEN, of Florida, N. Y.

Freshman Class, German, to
ARTHUR WARNER KLEIN, of Bethlehem.

Freshman Class, Themes, to
MAURICE CLARK BENEDICT, of Altoona.

Freshman Class, Rhetoric, to
CHARLES FORD CARMAN, of Cedarville, N. J.

Freshman Class, Freehand Drawing, to
RUSSELL KIMBALL, of New York City.

Freshman Class, General Chemistry, to
GEORGE REIFSNYDER JACKSON, of Scranton.

The following Degrees were conferred :

PH. D.

HERMAN EUGENE KIEFER, A.C., M.S., South Bethlehem.

E.M.

WILLIAM HENRY BROWN, B.S. (in Mining), Yatesville.
JOHN THOMAS CALLAGHAN, JR., B.S. (in Metallurgy), Washington, D.C.
HOWARD ECKFELDT, B.S. (in Metallurgy), Conshohocken.
ALBERT BEARDSLEY JESSUP, B.S. (in Mining), Scranton.
ARTHUR HUGHES LEWIS, B.S. (in Mining), Plains.
JOSEPH PHILIPS, JR., B.S. (in Metallurgy), Nashville, Tenn.
CARLOS YGLESIAS, B.S. (in Mining), San Jose, Costa Rica.

B. A.

WARREN JOSHUA BIEBER, Bethlehem.
ROBERT EDWARD LARAMY, Bethlehem.
JOSEPH WHARTON THURSTON, South Bethlehem.

B. S.

HOWARD FRANKLIN BOYER, Springtown.

C. E.

ALBERT DOANE AYRES, Williamsport.
LEWIS WARRINGTON BALDWIN, Waterbury, Md.
SPRINGFIELD BALDWIN, Baltimore, Md.
FREDERICK RAWDON BARTLES, Williamsport.
FAIRFAX BAYARD, Washington, D.C.
EDGAR TWEEDY BELDEN, Springdale, Conn.
MORIZ BERNSTEIN, Philadelphia.
DANIEL WILLIAM BLIEM, Pottstown.
EDWARD ELISHA BRATTON, Lewistown.
FREDERIC ALLYN DABOLL, Plainfield, N.J.
FRANK OLIVER DUFOUR, Hardesty, Md.
EDWARD MIALL DURHAM, JR., Vicksburg, Miss.
GEORGE RAMSEY ENSCOE, Bennett.
HENRY NEFF HERR, Wheatland Mills.
ROBERT PARSONS HOWELL, Blairstown, N.J.

Victor Witmer Kline,	Lockport, N.Y.
John Buckley MacBride,	Deckertown, N.J.
John Henry Myers,	Lewistown.
Walter Raleigh Okeson,	Bethlehem.
Horace Lucius Palmer,	Frenchtown, N.J.
Homer Austin Reid,	Warren, Ohio.
George Homer Ruggles,	Cherokee, Iowa.
Clement Clarence Rutter,	Lansford.
John Cornelius Sesser,	St. Joseph, Mich.
Luther D. Showalter,	Pottstown.
Ulysses Grant S. Walters,	Pottstown.
Frank Thomas Weiler,	Pequea.

M. E.

William Stewart Ayars,	Wilkes-Barre.
Hobart Bentley Ayers,	Westerly, R.I.
Hasell Wilson Baldwin,	Zanesville, O.
Frank Shepard Bromer,	Schwenksville.
George Amandus Buvinger,	Dayton, O.
Eckley Samuel Cunningham,	Drifton.
Samuel Philip Curtis,	Pen Yan, N.Y.
John William Dalman,	Fort Wayne, Ind.
William Carter Dickerman,	Milton.
Edward Hiram Dutcher, jr.,	South Meriden, Conn.
Charles Victor Ferriday,	South Bethlehem.
Thomas Joseph Gannon,	South Bethlehem.
William Heald Groverman,	Ellicott City, Md.
Howard Drysdale Hess,	Philadelphia.
Caleb Wheeler Lord,	Lebanon.
Rafael de la Mora,	Guadalajara, Mexico.
Morris Wright Pool,	Washington, D.C.
James Lee Rankin, jr.,	Savannah, Ga.
*Arthur Yeager Shepherd,	Wilkes-Barre.
Henry Shriver, jr.,	Cumberland, Md.
Edward Stewart Taylor,	Fort Wayne, Ind.
Harry Conklin Tripp,	Millerton, N. Y.
Harry Dallam Webster,	Baltimore, Md.

*Died June 5, having completed the work required for graduation.

B. S.

(In Metallurgy).

George Pomeroy Bartholomew,	Jeanesville.
William Alvin Evans,	Summit Hill.
Victor Albert Johnson,	St. Paul, Minn.
Edward Williamson Miller,	Bethlehem.
John Augustus Thomson,	Summit Point, W. Va.
Edward Coppée Thurston,	South Bethlehem.
John Scofield Wallace,	New Castle.

E. E.

William James Adams, jr.,	Harrisburg.
Arthur Davison Badgley,	South Bethlehem.
Francis Hoskins Baldwin,	New Haven, Conn.
Charles Champlin Walker Bauder,	Rheims, N. Y.
Aaron Beaumont Carpenter,	Avondale.
Malcolm Carrington,	Richmond, Va.
Frank Leslie Cooke,	Hackettstown, N. J.
Timothy Sharpe Eden,	Brown's Town, Jamaica.
Curtis Bertram Flory,	Scranton.
Clarence Richard Fountain,	Washington, D. C.
James Brown Given,	Carlisle.
John Savage Graff,	Williamsport.
David Hall,	Fayetteville, Tenn.
William Steell Jackson,	Duncannon.
Bruce Emerson Loomis,	Wilkes-Barre.
Clifford Sherron MacCalla,	Philadelphia.
Charles Howard Morgan,	Maxatawny.
William Hitz Mussey,	Washington, D. C.
Franklin Oberly,	Easton.
Henry Paul Reed,	Fort Schuyler, N. Y.
William Bailey Taylor,	Bethlehem.
Curtis Edwards Trafton,	Fall River, Mass.
Job Roberts Wilson,	Bethlehem.
Alfred Mahlon Worstall,	Millville, N. J.

A. C.

Herbert Huebener Beck,	Lititz.
Maximilian Joseph Bucher,	Columbia.

Robert Edwin Kresge,	South Bethlehem.
Victor Emanuel Masson,	Hammondsport, N. Y.
Louis Atwell Olney,	Providence, R. I.

B. S.

(In Architecture).

Samuel Moses Dessauer,	Montrose.
Jacob Grafius Petrikin,	Lock Haven.
Davis Sanno Williams,	Fort Snelling, Minn.
David William Wilson, Jr.,	Brooklyn, N. Y.

THE WILBUR SCHOLARSHIP.

This Scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200 awarded annually to the student in the Sophomore Class having the best record.

THE ALUMNI SCHOLARSHIP.

The Alumni Association of the University has established a Scholarship of the value of $250 per annum, subject to the following conditions:

1. That the Scholarship shall only be awarded to a student in need of it.

2. That the Scholarship shall not apply to the first year of any students' course; he must without this aid have gone through one year, and must be prepared to start the second year free from all conditions.

3. That the Scholarship shall not be continued to a student who shall at any time during his course carry any condition over eight weeks beyond the date of the examination in which he failed.

Subject only to the above conditions the disposal of the fund shall until otherwise directed be in the hands of the President of the University.

THE HENRY S. HAINES MEMORIAL SCHOLARSHIP.

Mrs. Henry S. Haines, of Savannah, Ga., has established a scholarship of the annual value of $200, which is to be devoted to the support at the Lehigh University, through-

out his scholastic career, of one student in the School of Mechanical Engineering.

THE FRED. MERCUR MEMORIAL FUND SCHOLARSHIPS.

Friends of the late Frederick Mercur, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, have contributed and placed in the hands of the Trustees a fund, to be called "The Fred. Mercur Memorial Fund," sufficient in amount to insure the award of several scholarships for free tuition in the University.

WILBUR PRIZES.

By the generosity of E. P. Wilbur, Esq., a fund has been established, yielding an annual income of $100, for distribution in prizes as the Faculty shall determine.

ALUMNI PRIZES FOR ORATORY.

The "Alumni Association of the Lehigh University" has established an annual sum of Fifty Dollars, to be distributed in prizes for excellence in Oratory, subject to the following

REGULATIONS.

1. The Contest shall be held on the 22d day of February, or on the day designated by the University to commemorate the birthday of Washington.

2. There shall be a first prize of $25, a second of $15, and a third of $10.

3. To entitle one to be a competitor he must be a member of the Junior Class, taking a regular course.

4. Subjects for the oration shall be announced at the beginning of the first term of every year, and upon one of these each competitor shall write an oration not to exceed 1200 words, taking about eight minutes in delivery.

5. Each oration shall bear upon its first page a fictitious name or motto, and shall be accompanied by a sealed envelope, which shall be superscribed with the same name or motto, and an address by which it may be reclaimed. The envelope shall contain the real name and address of

the writer, with the declaration that the oration is his own original work. The examiner, having adopted a standard of excellence, may reject any or all of the orations presented which do not attain to this standard; of such as do —should they be sufficient in number—the best six shall be chosen, and their envelopes opened. The others shall be returned to the address given with their envelopes unopened.

6. The Executive Committee of the Alumni Association, or a committee of not fewer than three to be appointed by them, shall hear the competitors whose orations shall have been approved, and the awards shall be made by a majority of these judges.

7. In awarding the prizes the judges shall consider both the literary merits and the delivery of each oration.

8. These rules are subject to amendment by the Faculty.

ENTRANCE EXAMINATION PAPERS.

Used for Examination in 1896.

I.—ENGLISH.

I. Grammar.

Be very careful about spelling, punctuation and division into paragraphs.

1. Of what does English Grammar treat? Why should it be studied by those who speak English?

2. Define Orthography, Etymology, Syntax and Prosody.

3. Define a Noun. How many sorts of nouns are there? What difference in their spelling?

4. Define a Letter, a Syllable and a Word.

5. Name the Ten Parts of Speech. Which are absolutely necessary to form a sentence?

6. Define a Sentence, a Clause, a Principal Clause, a Subordinate Clause. Write a complex sentence.

7. How are adjectives compared? What words are modified by adverbs? How are participles to be parsed in a sentence?

8. Decline all the Personal Pronouns.

9. Define a Strong Verb, a Weak Verb, an Irregular Verb, a Defective Verb. How are verbs divided with respect to their meaning?

10. Write the principal parts of the verbs: love, walk, swim, slay, teach, reach, meet, sing, swing, tell, write, catch, shrink, sink, be, beware, shall, will, ought, seethe.

11. Analyze the following sentences, correct them if necessary, and parse words in italics:

a. Every one must judge of their *own* feelings.

b. Observe them in the *order* they stand.

c. *Please* excuse my son's absence.

d. And so would I, if *I* were *he.*

e. Children should know that it is their duty to honor their *parents*, to ask advice of them, and to observe their wishes of whatever sort they may *be.*

12. Turn this into simple prose.

"Heaven from all creatures hides the book of fate,
All but the page prescribed, their present state;
From brutes what men, from men what spirits know;
Or who could suffer being here below?"

Then, put it all into one orderly complex sentence.

II. Rhetoric.

Write slowly and distinctly. Make each answer complete and a model of clearness and precision.

I. Define Rhetoric. Is it a science or an art? Compare it, in this respect, with grammar and logic.

II. What is the province of Style? Its most essential element? Define Style. What is individuality in Style?

III. Define diction. What cautions are to be observed about "present use" of words? About Latin or Saxon words? About provincial, technical and archaic words?

IV. What are figures of speech? When is their use appropriate? What figures promote clearness and concreteness? What is an abstract idea?

V. State the essentials of a good definition. Define any three common nouns on that plan. Define a *rule* and a *concrete example.*

VI. State the rhetorical value of a Simile and a Metaphor. How do they differ? Upon what relation is Metonymy based? What are the natural defects of Allegory?

VII. Meanings of Allegory, Personification, Antithesis; upon what principle is the latter based? What are a climax and an anti-climax? Is the latter ever allowable?

VIII. What is meant by Suspension? What is a balanced sentence; a loose sentence; a periodic sentence?

What are synonyms, and on what principle are they to be distinguished and used? What are homonyms?

IX and X. Write a short piece of descriptive prose of not more than 200 words on one of the following subjects:

1. The Forest of Arden.
2. London Streets during the Plague.
3. Buckthorne's Estate in the Hands of the Booby Squire.
4. The Adventure at the Inn of Terracina.
5. Silas Marner's Home.

II.—GEOGRAPHY.

Outline maps of the Central part of the United States, and of Western Asia, were furnished to each applicant, and he was required to draw the boundaries of countries, provinces, states and territories, and name them, to place and name the capital or chief city of each, and the principal rivers and mountain systems.

III.—UNITED STATES HISTORY.

1. What was the last important battle that settled the supremacy of the English over the French on the American continent.

2. What were the "Articles of Confederation," and when were they adopted?

3. What were the leading events of John Adams' administration?

4. Give the leading events, domestic and foreign, of the two terms of Monroe's administration.

5. *a*) What occasioned the Missouri compromise? *b*) What were its provisions?

6. What were the four parties at the presidential election of 1860? and who were the candidates?

7. What caused the expedition of John Brown? when and where did it take place?

8. Who declares war in the United States, and who makes peace?

9. How is a vacancy caused by the removal, death, resignation or inability of the Vice-President to be provided for?

10. How are the states protected?

IV.—ARITHMETIC.*

I. $(\frac{3}{4} + \frac{17}{18} + 1.075) \div (24\frac{3}{4} - 16.792 - \frac{7}{5}) = ?$

II. 5 miles, $10\frac{1}{2}$ rods, 3 ft. $2\frac{1}{3}$ in.; how many centimeters?

III. Find the interest, true discount, and bank discount on $27 for 90 days at $5\frac{1}{2}$ %.

IV. (*a*) At what price must a 6% stock be bought to pay 8% on the investment?

(*b*) Find present worth of a 6% note for $313, which has been running 3 months and is due in 6 months, money being worth 5% in the market?

V. How many bushels will a bin 3 ft. 6 in. x 2 ft. 6 in. x 6 ft. hold? How many gallons if it is a water tank?

VI. Give the number of sq. ft. in an acre; sq. chains in an acre; chains in a mile. How is the lineal unit (yard) determined? State the rule for fixing the decimal point in multiplication and division, and give the reason for it.

V.—GEOMETRY.

1. *a.* Show what is the locus of all points equally distant from the sides of an angle.

   b. Show what three bisectors of the angles of a triangle, both interior and exterior, meet in a common point.

2. Show what is the measure of an angle formed by two intersecting chords, whether they intersect within or without the circle.

*In 1897, and thereafter, Arithmetic will not be required for admission to the University.

3. Show how to divide a line internally in the ratio 3:4 and externally in the ratio 4:7.

4. *a.* Show how to construct a square equal to $\frac{2}{3}$ of a given square.

   b. Of all plane figures with the same area the circle has the least perimeter.

5. Show how to inscribe a regular decagon in a circle.

6. Two rectangles with equal bases are to each other as their altitudes. (Both cases.)

7. Show how to compute the ratio of a circumference to its diameter.

8. *a.* If a plane is perpendicular to one of two parallel lines it is perpendicular to the other.

   b. If a line is perpendicular to one of two parallel planes it is perpendicular to the other.

9. The sum of two face angles of a triedral angle is greater than the third.

10. *a.* State when a line is divided harmonically; when in extreme and mean ratio. What is meant by the angle between two lines that do not intersect?

    b. Define a continued proportion. When are four quantities said to be proportional? When are three? When two?

    c. State the various conditions that will cause two triangles to be similar. How do similar polygons compare?

VI.—ALGEBRA.

1. Reduce to forms having rational denominators:

$$\frac{3}{\sqrt{3}+\sqrt[3]{5}};\quad \frac{1+\sqrt{-1}}{1-\sqrt{-1}};\quad \frac{x}{\sqrt[3]{-y^2}};\quad \frac{x}{\sqrt[3]{(-y)^2}};$$

$$\frac{a}{\sqrt{b}+\sqrt{c}+\sqrt{d}}$$

2. Expand $(x^{-\frac{1}{2}}-y^{\frac{1}{3}})^{-\frac{1}{4}}$ and $(x^2-y^2)^{\frac{1}{2}}$ to five terms by binomial formula.

3. Show that $x^n - y^n$ is divisible by $x - y$, and show what the statement becomes when y is negative.

4. Solve $\dfrac{5x - 9}{\sqrt{5x} + 3} - 1 = \dfrac{\sqrt{5x} - 3}{2}$. Verify.

Given a, n, and l, of a geometrical progression to find s.

5. Solve $x + y = 4$, $\dfrac{1}{x} + \dfrac{1}{y} = 1$. Also $x^2 + xy = 12$, $xy + y^2 = 2$.

6. Solve $\sqrt{x - \dfrac{1}{x}} + \sqrt{x - \dfrac{1}{x}} = x$.

Also $\sqrt{x + 8} - \sqrt{x + 3} = \sqrt{x}$. Verify.

7. A and B together can do a piece of work in 12 days, B and C in 20 days, and A and C in 15 days. How long will it take each to do it, and how long for all to do it working together?

8. The sides of a rectangle are 8 and 6. Required the sides of another rectangle having twice its area and twice its perimeter.

9. Solve $x^2 + y^2 + x + y = 18$, $xy = 6$.
Also $x^2 + y^2 = 12$, $xy = 20$.
How is it seen at once that x and y in the latter are imaginary?

10. (*a*) State the conditions and give the rules for simplifying a radical.

(*b*) What equations may be solved as quadratics? Define an arithmetical progression and give the formulæ belonging to it.

(*c*) Give the rules for algebraic signs in multiplication and division and the reasons for them. State the distinction between terms and factors.

VII.—PHYSICS.

1. Define:
   - *a.* Momentum;
   - *b.* Dyne;
   - *c.* Center of Gravity;
   - *d.* Length of a Pendulum;
   - *e.* Electrostatic Unit of Capacity;
   - *f.* Coulomb;
   - *g.* Beats;
   - *h.* Timbre;
   - *i.* Evaporation;
   - *j.* Latent Heat of Vaporization;
   - *k.* Conjugate Foci;
   - *l.* Dispersion.

2. *a.* What is the difference between a gas and a vapor?
   b. Explain by means of diagrams (1) how the resultant of several forces is found, and (2) how to resolve a force into two components.

3. A body weighing 10 pounds is projected vertically upward with a velocity of 289.44 feet per second.
   a. How high will it rise?
   b. What heat in lesser calories will be developed upon impact with the earth on its descent?

4. *a.* State Mariott's Law.
   b. A hydrostatic press has lever arms 1 and 5 feet respectively and pistons of 2 and 10 inches diamter respectively. What pressure can be obtained at the large piston by a power of 100 lbs. on the lever, allowing a loss of 10% by friction?

5. *a.* State the differences between a sound wave and a water wave; between noise and music.
   b. What constitutes the tone of an organ pipe, and upon what does its pitch depend?

6. A copper calorimeter weighing 20.31 grams contains 30.17 g. of water at 23°C. A piece of silver weighing 40.22 g.

is heated to 98° and dropped into the water in calorimeter. The resulting temperature of calorimeter and and contents is found to be 28°C. Calculate the specific heat of silver. (Specific heat of copper =.095.)

7. *a.* What is the difference between heat and temperature?
   b. Explain the three ways of diffusing heat.

8. *a.* What is the velocity of light?
   b. State Laws of Refraction.
   c. With a double convex lens where is the image when object is beyond secondary focus? Show by diagrams how this fact is made use of in either the photographic camera or the telescope.

9. A copper wire 300 ft. long and 9 mils in diameter has the same resistance as 554 ft. of silver wire 12 mils in diameter. Taking the conductivity of silver as 1, compute the conductivity of copper.

10. Given 8 cells each of an E.M.F. of 2 volts and internal resistance of $\frac{1}{2}$ ohm. Determine the most efficient grouping with an external resistance of 8 ohms. What will be the current in amperes and the power in watts when thus grouped?

VIII.—LATIN.

I. Grammar.

Decline *dea*, *os* (a bone), *mare*, *domus*, *acies*, *iste*, *duo*, *nequam*, *uterque*.

Compare *felix*, *gracilis*, *vetus*.

Write the ordinal numerals from one to ten.

Give the full synopsis of *audeo*, *audio*, *capio*, *fio*.

Give all the participles of *hortor*.

State the gender of the following words with the reason for such as come under special rules: *quercus*, *nauta*, *virus*, *alvus*.

Derive adverbs from the following adjectives and compare them: *audax*, *verus*, *bonus*.

What are the varieties of the Conditional Sentence?

What cases follow these words: *memini*, *persuadeo*, *vescor*, *dignus?*

Give the rules which govern the Indirect Discourse, both for principal and secondary clauses.

II. Caesar.

Translate (*Bk. I.*, § *34*):

Ei legationi Ariovistus respondit: si quid ipsi a Caesare opus esset, sese ad eum venturum fuisse; si quid ille se velit, illum ad se venire oportere. Praeterea se neque sine exercitu in eas partes Galliae venire audere, quas Caesar possideret, neque exercitum sine magno commeatu atque molimento in unum locum contrahere posse. Sibi autem mirum videri, quid in sua Gallia, quam bello vicisset, aut Caesari aut omnino populo Romano negotii esset.

Write the verbs here used, changing them into the tenses of the Direct Discourse.

Translate (*Bk. IV.*, § *7*):

Re frumentaria compara equitibusque delectis iter in ea loca facere coepit, quibus in locis esse Germanos audiebat. A quibus cum paucorum dierum iter abesset, legati ab his venerunt, quorum haec fuit oratio: Germanos neque priores populo Romano bellum inferre neque tamen recusare, si lacessantur, quin armis contendant, quod Germanorum consuetudo sit a maioribus tradita, quicumque bellum inferant, resistere neque deprecari. Haec tamen dicere, venisse invitos, ejectos domo.

Give nominative singular of *loca*. Give syntax of *iter* and *domo*.

III. Vergil.

Translate (*Bk. II.*, *line 57*):

Ecce, manus iuvenem interea post terga revinctum
pastores magno ad regem clamore trahebant
Dardanidae, qui se ignotum venientibus ultro,

hoc ipsum ut strueret Troiamque aperiret Achivis,
obtulerat, fidens animi atque in utrumque paratus,
seu versare dolos, seu certae occumbere morti.

Give principal parts of *trahebant* and *occumbere.* What is the syntax of *animi?*

Translate (*Bk. IV., line 607*):

Sol, qui terrarum flammis opera omnia lustras,
tuque harum interpres curarum et conscia Iuno,
nocturnisque Hecate triviis ululata per urbes,
et Dirae ultrices, et di morientis Elissae,
accipite haec, meritumque malis advertite numen,
et nostras audite preces.

What is the connection of this passage?

Write out the first three lines, marking the quantity of each syllable, separating the feet, and indicating the caesura.

Translate (*Bk. VI., line 124*):

Talibus orabat dictis, arasque tenebat,
cum sic orsa loqui vates: 'Sate sanguine divom,
Tros Anchisiade, facilis descensus Averno;
noctes atque dies patet atri ianua Ditis;
sed revocare gradum superasque evadere ad auras,
hoc opus, hic labor est.'

Explain the syntax of *sanguine* and *Averno.*

IV. Cicero.

Translate (*In Catilinam Or. II.*):

Quod expectavi, iam sum adsecutus, ut vos omnes factam esse aperte coniurationem contra rem publicam videretis: nisi vero si quis est qui Catilinae similis cum Catilina sentire non putet. Non est iam lenitati locus: severitatem res ipsa flagitat. Unum etiam nunc concedam: exeant, proficiscantur; ne patiantur desiderio sui Catilinam miserum tabescere. Demonstrabo iter: Aurelia via profectus est: si adcelerare volent, ad vesperam consequentur.

(*In Catilinam Or. IV*):

Quae cum ita sint, patres conscripti, vobis populi Romani praesidia non desunt; vos ne populo Romano deesse videamini providete. Habetis consulem ex plurimis periculis et insidiis atque ex media morte, non ad vitam suam, sed ad salutem vestram reservatum. Omnes ordines ad conservandam rem publicam mente, voluntate, voce consentiunt.

(*Manilian Law*):

Est haec divina atque incredibilis virtus imperatoris. Quid ceterae, quas paulo ante commemorare coeperam, quantae atque quam multae sunt? Non enim bellandi virtus solum in summo ac perfecto imperatore quaerenda est, sed multae sunt artes eximiae huius administrae comitesque virtutis. Ac primum, quanta innocentia debent esse imperatores? quanta deinde in omnibus rebus temperantia? quanta fide? quanta facilitate? quanto ingenio? quanta humanitate?

V. Sight.

Translate:

Conatus est Caesar reficere pontes: sed nec magnitudo fluminis permittebat, neque ad ripam dispositae cohortes adversariorum perfici patiebantur; quod illis prohibere erat facile cum ipsius fluminis natura atque aquae magnitudine, tum quod ex totis ripis in unum atque angustum locum tela iaciebantur; atque erat difficile eodem tempore rapidissimo flumine opera perficere et tela vitare.

VI. Prose Composition.

Translate into Latin:

Caesar sent his lieutenant to see in what direction the enemy were making their march. He reported that the Germans were two miles away with all their forces. Caesar fortified a camp and early in the morning gladly drew up his line of battle before the camp on the top of a hill. After a fierce battle he routed the enemy with the loss of six hundred of his soldiers.

VII. Roman History.

1. Give the names of the traditional kings of Rome with an account of the abolition of regal power.
2. Describe the Latin War and give its date.
3. Mention the causes of the First Punic War, with date.
4. Describe the career of Hannibal.
5. Give the life of Marius.

IX.—GREEK.

I. Grammar.

1. Decline, through all numbers: *ἡ στάσις, ὁ ἱερεύς, τὸ μέλος, σωτήρ, ἀνήρ*; through all numbers and genders: *μέλας, ἁπλοῦς, μέγας.*

2. Give comparative and superlative forms of: *μέσος, σώφρων, ἐχθρός, κακός, ῥάδιος, ταχέως.*

3. Give the aorist indicative active, singular and plural, of *ἵημι*; the perfect indicative active, singular and plural, of *ἵστημι.*

4. Give a synopsis (first person singular of each mood) of the present of *εἰμι* and of *εἰμί*; the future active of *μένω*; the future middle of *κομίζω*; the aorist active of *γιγνώσκω*; the aorist middle of *δίδωμι*; the aorist passive of *στέλλω*; the perfect active of *οἶδα.*

5. Name three classes of verbs that are used with the Genitive.

6. Name two prepositions that are used with Genitive, Dative, and Accusative, and give meaning of each with each case.

7. *Translate:*

εἰ ἦλθες, αὐτὸν ἂν εἶδες.
εἰ ἔλθοις, αὐτὸν ἂν ἴδοις.
ἐὰν ἔλθῃς, αὐτὸν ὄψει.

8. *Translate:*

φαίνεται ἀγαθὸς ὤν.
φαίνεται ἀγαθὸς εἶναι.

9. *Translate:*

οἶδα γράφειν.
οἶδα γράφων.

II. Xenophon.

1. *Translate:*

εἰ δέ τινα ὁρῷη δεινὸν ὄντα οἰκονόμον ἐκ τοῦ δικαίου καὶ κατασκευάζοντά τε ἧς ἄρχοι χώρας καὶ προσόδους ποιοῦντα, οὐδένα ἂν πώποτε ἀφείλετο, ἀλλ' ἀεὶ πλείω προσεδίδου· ὥστε καὶ ἡδέως ἐπόνουν καὶ θαρραλέως ἐκτῶντο καὶ ὃ ἐπέπατο αὖ τις ἥκιστα Κῦρον ἐκρυπτεν· οὐ γὰρ φθονῶν τοῖς φανερῶς πλουτοῦσιν ἐφαίνετο, ἀλλὰ πειρώμενος χρῆσθαι τοῖς τῶν ἀποκρυπτομένων χρήμασι· φίλους γε μὴν ὅσους ποιήσαιτο καὶ εὔνους γνοίη ὄντας καὶ ἱκανοὺς κρίνειε συνεργοὺς εἶναι ὅ τι τυγχάνοι βουλόμενος κατεργάζεσθαι, ὁμολογεῖται πρὸς πάντων κράτιστος δὴ γενέσθαι θεραπεύειν. καὶ γὰρ αὐτὸ τοῦτο οὗπερ αὐτὸς ἕνεκα φίλων ᾤετο δεῖσθαι, ὡς συνεργοὺς ἔχοι, καὶ αὐτὸς ἐπειρᾶτο συνεργὸς τοῖς φίλοις κράτιστος εἶναι τούτου ὅτου ἑκαστον αἰσθάνοιτο ἐπιθυμοῦντα·

Explain the construction (1) of each genitive, (2) of each dative, (3) of *οὐδένα* (l. 2) and *Κῦρον* (l. 4), (4) of each optative.

Analyze every contracted syllable.

Which rules of accentuation are illustrated in the first sentence as far as *ποιοῦντα*?

2. *Translate:*

ἀπορουμένοις δ' αὐτοῖς προσελθών τις ἀνὴρ Ῥόδιος εἶπεν· Ἐγὼ θέλω, ὦ ἄνδρες, διαβιβάσαι ὑμᾶς κατὰ τετρακισχιλίους ὁπλίτας, ἂν ἐμοὶ ὧν δέομαι ὑπηρετήσητε, καὶ τάλαντον μισθὸν πορίσητε. ἐρωτώμενος δὲ ὅτου δέοιτο, Ἀσκῶν, ἔφη, δισχιλίων δεήσομαι· πολλὰ δ' ὁρῶ πρόβατα καὶ αἶγας καὶ βοῦς καὶ ὄνους, ἃ ἀποδαρέντα καὶ φυσηθέντα ῥᾳδίως ἂν παρέχοι τὴν διάβασιν· δεήσομαι δὲ καὶ τῶν δεσμῶν οἷς χρῆσθε περὶ τὰ ὑποζύγια· τούτοις ζεύξας τοὺς ἀσκοὺς πρὸς ἀλλήλους, ὁρμίσας ἕκαστον ἀσκὸν λίθους ἀρτήσας καὶ ἀφεὶς ὥσπερ ἀγκύρας εἰς τὸ ὕδωρ, διαγαγὼν καὶ ἀμφοτέρωθεν δήσας, ἐπιβαλῶ ὕλην καὶ γῆν ἐπιφορήσω· ὅτι μὲν οὖν οὐ καταδύσεσθε αὐτίκα μάλα εἴσεσθε· πᾶς γὰρ ἀσκὸς δύο ἄνδρας ἕξει τοῦ μὴ καταδῦναι· ὥστε δὲ μὴ ὀλισθάνειν ἡ ὕλη καὶ ἡ γῆ σχήσει.

At what point in the history of the Expedition does the above incident occur?

3. *Translate, at sight:*

Καὶ ἀφικνοῦνται ἐπὶ τὸ ὄρος τῇ πέμπτῃ ἡμέρᾳ· ὄνομα δὲ τῷ ὄρει ἦν Θήχης. ἐπεὶ δὲ οἱ πρῶτοι ἐγένοντο ἐπὶ τοῦ ὄρους καὶ κατεῖδον τὴν θάλατταν, κραυγὴ πολλὴ ἐγένετο. . . . . ἐπειδὴ δὲ βοὴ πλείων τεἐγί-

γνετο καὶ ἐγγύτερον, καὶ οἱ ἀεὶ ἐπιόντες ἐθεον δρόμῳ ἐπὶ τοὺς ἀεὶ βοῶντας, καὶ πολλῷ μείζων ἐγίγνετο ἡ βοὴ ὅσῳ δὴ πλείους ἐγίγνοντο, ἐδόκει δὴ μεῖζόν τι εἶναι τῷ Ξενοφῶντι. καὶ ἀναβὰς ἐφ' ἵππον, καὶ Λύκιον καὶ τοὺς ἱππέας ἀναλαβὼν, παρεβοήθει· καὶ τάχα δὴ ἀκούουσι βοώντων τῶν στρατιωτῶν Θάλαττα, Θάλαττα, καὶ παρεγγυώντων. ἔνθα δὴ ἔθεον πάντες καὶ οἱ ὀπισθοφύλακες, καὶ τὰ ὑποζύγια ἠλαύνετο καὶ οἱ ἵπποι. ἐπεὶ δὲ ἀφίκοντο πάντες ἐπὶ τὸ ἄκρον, ἐνταῦθα δὴ περιέβαλλον ἀλλήλους καὶ στρατηγοὺς καὶ λοχαγοὺς δακρύοντες. καὶ ἐξαπίνης, ὅτου δὴ παρεγγυήσαντος, οἱ στρατιῶται φέρουσι λίθους καὶ ποιοῦσι κολωνὸν μέγαν.

Θάλαττα: sea.

παρεγγυάω: pass the word along.

περιβάλλω: embrace.

κολωνός: mound.

III. Homer.

1. *Translate:*

"Ζεῦ πάτερ, εἴποτε δή σε μετ' ἀθανάτοισιν ὀνησα
ἢ ἔπει ἢ ἔργῳ, τόδε μοι κρήηνον ἐέλδωρ·
τίμησόν μοι υἱὸν, ὃς ὠκυμορώτατος ἄλλων
ἔπλετ'· ἀτάρ μιν νῦν γε ἄναξ ἀνδρῶν Ἀγαμέμνων
ἠτίμησεν· ἑλὼν γὰρ ἔχει γέρας, αὐτὸς ἀπούρας.
ἀλλὰ σύ πέρ μιν τῖσον, Ὀλύμπιε μητίετα Ζεῦ·
τόφρα δ' ἐπὶ Τρώεσσι τίθει κράτος, ὄφρ' ἂν Ἀχαιοὶ
υἱὸν ἐμὸν τίσωσιν, ὀφέλλωσιν τέ ἑ τιμῇ."

Name all Epic forms, giving the equivalent Attic ones.

2. *Translate:*

"Ὦ πόποι, ἦ δὴ παισὶν ἐοικότες ἀγοράασθε
νηπιάχοις, οἷς οὔτι μέλει πολεμήια ἔργα.
πῇ δὴ συνθεσίαι τε καὶ ὅρκια βήσεται ἡμῖν;
ἐν πυρὶ δὴ βουλαί τε γενοίατο μήδεά τ' ἀνδρῶν,
σπονδαί τ' ἄκρητοι καὶ δεξιαί, ᾗς ἐπέπιθμεν·
αὔτως γάρ ῥ' ἐπέεσσ' ἐριδαίνομεν, οὐδέ τι μῆχος
εὑρέμεναι δυνάμεσθα, πολὺν χρόνον ἐνθάδ' ἐόντες.

Mark quantities of syllables, divisions into feet, and caesuras.

3. *Translate:*

Δεύτερον αὖτ' Ὀδυσῆα ἰδὼν ἐρέειν' ὁ γεραιός.
"εἶπ' ἄγε μοι καὶ τόνδε, φιλὸν τέκος, ὅστις ὅδ' ἐστίν.
μείων μὲν κεφαλῇ Ἀγαμέμνονος Ἀτρείδαο,

εὐρύτερος δ' ὤμοισιν ἰδὲ στέρνοισιν ἰδέσθαι.
τεύχεα μέν οἱ κεῖται ἐπὶ χθονὶ πουλυβοτείρῃ,
αὐτὸς δὲ κτίλος ὡς ἐπιπωλεῖται στίχας ἀνδρων·
ἀρνειῷ μιν ἔγωγε ἐΐσκω πηγεσιμάλλῳ,
ὸς τ' ὀίων μέγα πῶϋ διέρχεται ἀργεννάων."
Τὸν δ' ἠμείβετ' ἔπειθ' Ἑλένη Διὸς ἐκγεγαυῖα·
"οὗτος δ' αὖ Λαερτιάδης, πολύμητις Ὀδυσσεύς,
ὸς τράφη ἐν δήμῳ Ἰθάκης κραναῆς περ ἐούσης,
εἰδὼς παντοίους τε δόλους καὶ μήδεα πυκνά."

Describe the circumstances under which this conversation was held.

IV. History.

1. Describe the legislation ascribed to Lycurgus at Sparta.
2. Give an account, with dates, of all occasions on which the Persians and the European Greeks came in contact with each other.
3. Name three of the leading men on each side in the Peloponnesian War and describe their characters.
4. Give an account of the supremacy of Thebes.
5. Give an account of the political life of Demosthenes.

STUDENTS.

Clas.—Classical.
L.S.—Latin-Scientific.
Sci.—Science and Letters.
A.C.—Analytical Chemistry.
C.E.—Civil Engineering.
E.M.—Mining Engineering.
M.E.—Mechanical Engineering.
E.E.—Electrical Engineering.
Arch.—Architecture.

GRADUATE STUDENTS.

	For Degree.	Residence.
Wm. N. R. Ashmead, B.A.,	M.A.,	Philadelphia.
Henry M. S. Cressman, B.A.,	M.A.,	Egg Harbor City, N.J.
Eckley S. Cunningham, M.E.,	M.S.,	Drifton.
Walter Joseph Dech, B.A.,	M.A.,	Bethlehem.
Charles M. Douglas, B.A.,	M.A.,	New York City.
William H. Hoffman, B.C.E.,	M.S.,	Lafayette, Ind.
Elmer Augustus Jacoby, B.A.,	M.A.,	Bethlehem.
Charles Lincoln Keller, M.E.,	M.S.,	Chicago, Ill.
William Allen Lambert, B.A.,	M.A.,	Philadelphia.
Harry K. Landis, B.S., E.M.,	M.S.,	New York City.
E. Williamson Miller, B.S.,	E.M.,	Bethlehem.
Harlan Sherman Miner, A.C.,	M.S.,	Gloucester, N.J.
Howard Segar Neiman, A.C.,	M.S.,	Albany, N.Y.
David Kirk Nicholson, M.E.,	M.S.,	Braddock.
Samuel Arthur Rhodes, E.E.,	M.S.,	Austin, Ill.
Ira A. Shimer, B.A.,	M.A.,	Philadelphia.
John Eugene Stocker, B.S.,	M.S.,	Upper Alton, Ill.
John Augustus Thomson, B.S.,	E.M.,	Summit Point, W.Va.

SENIOR CLASS.

	Course.	Residence.
Francis DuPont Ammen,	M.E.,	Ammendale, Md.
Henry Jonathan Biddle Baird,	E.M.,	West Chester.
Lathrop Hutchings Baldwin,	M.E.,	Allentown.
Charles Marshall Barton,	C.E.,	Pikesville, Md.
Frank Breckenridge Bell,	M.E.,	Mercer.
Harry Layfield Bell,	E.E.,	Norfolk, Va.
William Ragan Binkley,	E.E.,	Hagerstown, Md.
Bertine Frederic Borhek,	A.C.,	West Bethlehem.
Charles Schwartze Bowers,	E.E.,	Philadelphia.
John Boyt,	E.M.,	Adamsford.
William Burke Brady,	M.E.,	Harrisburg.
Walter Everette Brown,	E.E.,	Stamford, Conn.
Sinclair Wiggins Chiles,	C.E.,	Sims City, Fla.
Thomas Holland Clagett,	E.M.,	Berryville, Va.
Barton Olmsted Curtis,	C.E.,	Monona, Iowa.
Patrick Edward Dinan,	A.C.,	South Bethlehem.
Louis Diven,	E.E.,	Elmira, N. Y.
Benjamin Irvin Drake,	E.M.,	Chicago, Ill.
Clifford George Dunnells,	C.E.,	Pittsburg.
Stuart Rhett Elliott,	E.M.,	Beaufort, S. C.
Albert Andrew Finkh,	M.E.,	Yonkers, N. Y.
Ira D. Fulmer,	E.E.,	Richland Centre.
Francisco Martinez Gallardo,	M.E.,	Guadalajara, Mex.
Orrin Satterlee Good,	E.E.,	Lock Haven.
Ralph Scofield Griswold,	E.E.,	Madison, N. J.
John Lewis Gross,	M.E.,	Wilkes-Barre.
William Thomas Hanly,	C.E.,	Philadelphia.
William Stephen Hiester,	E.E.,	Harrisburg.
Ross Nathaniel Hood,	E.E.,	Duncannon.
Oliver Zell Howard,	M.E.,	Hagerstown, Md.
Henry Taylor Irwin,	M.E.,	Allegheny.
Arthur Perkins Jenks,	E.E.,	Yardley.
Harry Sackett Johnson,	E.E.,	East Aurora, N.Y.
Lawrence Rust Lee,	M.E.,	Shepherdstown, W. Va

	Course.	Residence.
Telford Lewis,	E.M.,	Blairsville.
Charles Victor Livingston,	E.E.,	Kingston, N.Y.
Arthur Frost Loomis,	E.E.,	Oneida, N.Y.
Barry MacNutt,	E.E.,	Bethlehem.
James Gordon Mason,	E.M.,	West Pittston.
William Adams Megraw,	M.E.,	Baltimore, Md.
Estéban A. Mercenario,	C.E.,	Puebla, Mex.
Thaddeus Merriman,	C.E.,	South Bethlehem.
Frank Douglass Mount,	C.E.,	Manasquan, N.J.
Carl Pivany Nachod,	E.E.,	Glenside.
Henry H. Newton,	M.E.,	Guadalajara, Mexico.
Robert Collyer Noerr,	C.E.,	Washington, D.C.
Harry Richards Peck,	M.E.,	Scranton.
James Harkins Pennington,	M.E.,	Philadelphia.
Morris Havens Putnam,	M.E.,	Tioga.
John Peake Reynolds, jr.,	M.E.,	Charleston, S.C.
Robert Porterfield Richardson,	A.C.,	Easton.
Samuel Stewart Riegel,	M.E.,	South Bethlehem.
Eugene Peronnean Roundey,	C.E.,	East Orange, N.J.
Woodford Royce,	M.E.,	Willimantic, Conn.
Auguste Leopold Saltzman,	M.E.,	Plainfield, N.J.
Charles Fred. Sanders,	C.E.,	Kutztown.
Charles Francis Scott,	E.E.,	New York City.
Henry Hamilton Seabrook,	E.E.,	Beaufort, S.C.
Samuel Palmer Senior,	C.E.,	Washington, D.C.
Arthur Harold Serrell,	E.E.,	Plainfield, N.J.
Frank Bradley Sheaffer,	C.E.,	New Bethlehem.
John Leefe Sheppard, jr.,	M.E.,	Charleston, S.C.
Edward Peter Shuman,	C.E.,	Allentown.
Jonathan Edward Slade,	C.E.,	Chicago, Ill.
Michael Thomas Stack,	C.E.,	Shenandoah.
Alvin Riegel Sterner,	E.E.,	Bethlehem.
John Stewart, jr.,	E.M.,	Lonaconing, Md.
Paul Beno Straub,	E.E.,	Pittsburg.
Thomas Cedwyn Thomas,	E.M.,	Wilkes-Barre.
Columbus William Thorn,	C.E.,	Washington, D.C.

	Course.	Residence.
Wallace Treichler,	C.E.,	Elizabethtown.
William Edward Underwood,	M.E.,	Philadelphia.
Harrison Ricord VanDuyne,	E.E.,	Newark, N.J.
Charles Parker Wagoner,	C.E.,	Phœnixville.
Gilbert Case White,	C.E.,	Richmond, Va.
George Livingston Yates,	E.E.,	Carlisle.
Ambrose Everett Yohn,	M.E.,	Saxton.
Frank Steinmetz Young,	E.M.,	Plymouth Meeting.

JUNIOR CLASS.

	Course.	Residence.
Harry Leigh Adams,	C.E.,	Washington, D.C.
Thomas Johns Anderson,	C.E.,	Cumberland, Md.
Alanson Quigley Bailey,	Clas.,	Paterson, N.J.
Junius Ballard,	M.E.,	Louisburg, N.C.
Alejandro Barrientos,	C.E.,	Santiago de Cuba.
Henry David Bishop,	M.E.,	Bethlehem.
Henry Theodore Borhek,	E.M.,	Bethlehem.
Daniel John Broughal,	A.C.,	South Bethlehem.
Horatio Francis Brown,	M.E.,	Baltimore, Md.
Paul Bucher,	E.E.,	Lebanon.
David F. Castilla,	M.E.,	Coahuila, Mex.
David Hope Childs,	E.M.,	Towanda.
Herbert Myron Daggett,	E.E.,	Elmira, N.Y.
George Davies,	M.E.,	Catasauqua.
William Adam Dehm,	C.E.,	New Britain, Conn.
John Jacob Eckfeldt,	M.E.,	Conshohocken.
Linden Erle Edgar,	M.E.,	Wilkes-Barre.
Edgar Davis Edmonston,	E.E.,	Washington, D.C.
James Ralph Farwell,	C.E.,	Oswego, N.Y.
Edgar Raymond Frisby,	C.E.,	Washington, D.C.
Willard Boyer Fuller,	M.E.,	Catasauqua.
José Maria Garza Galán, jr.,	E.M.,	Saltillo, Mex.
Stuart John Gass,	E.E.,	Washington, D.C.
Robert Edward Lee George,	E.E.,	Ellicott City, Md.
William Gratz,	E.E.,	Carmel, N.J.

	Course.	Residence.
William Gummere,	A.C.,	South Bethlehem.
Frank Hammond Gunsolus,	C.E.,	Tipton, Iowa.
Wentworth Greene Hare,	M.E.,	Philadelphia.
Raymond Hazel,	E.E.,	Cressona.
Henry Bruner Hershey,	E.E.,	Columbia.
Herbert Henninger Hess,	E.E.,	Hellertown.
Edward Darling Hillman,	M.E.,	Wilkes-Barre.
Harold John Horn,	E.E.,	South Bethlehem.
Leonard Sherman Horner,	E.E.,	Marshall, Va.
Duncan Kennedy, jr.,	E.E.,	Washington, D.C.
Frank Norman Kneas,	C.E.,	Norristown.
Arthur Octavius Knight,	M.E.,	Westfield, N.J.
Basil George Kodjbanoff,	M.E.,	Monastir, Macedonia.
Jacob B. Krause,	Clas.,	South Bethlehem.
Thomas H. Lawrence,	E.E.,	Danville.
John Brown Lindsey, jr.,	C.E.,	Frankfort, Ky.
Clarence Albert Loomis,	C.E.,	Plainfield, N.J.
Owen Francis Luckenbach,	M.E.,	Bethlehem.
GeorgeKennedyMcGunnegle,	A.C.,	Meadville.
Lee Holmes Marshall,	M.E.,	Pittsburg.
Sidney Burbank Merrill,	A.C.,	Cincinnati, O.
Charles Francis Moritz,	E.E.,	South Bethlehem.
Charles G. Newton,	C.E.,	Guadalajara, Mex.
José Aristides de Obaldia,	C.E.,	Panama, Rep. Col.
John O'Reilly,	A.C.,	South Bethlehem.
Howard Charles Paddock,	C.E.,	East Berlin, Conn.
Frederick Allen Perley,	C.E.,	Williamsport.
Clarence Marion Pflueger,	A.C.,	Seidersville.
Carroll Winston Quarrier,	M.E.,	Charleston, W.Va.
Victor Clinton Records,	C.E.,	Laurel, Del.
Percy Lawrence Reed,	C.E.,	New Bedford, Mass.
Benjamin DeWitt Riegel,	M.E.,	Riegelsville, N. J.
D'Arcy Wentworth Roper,	M.E.,	Petersburg, Va.
Rafael Francisco Sanchez,	E.M.,	Gibara, Cuba.
Henry Cord Schwecke,	E.E.,	Charleston, S.C.
Henry Harger Scovil,	M.E.,	Copenhagen, N.Y.
Daniel Franklin B. Shepp,	C.E.,	Tamaqua.
Lewis Cheston Starkey,	M.E.,	Bustleton.

	Course.	Residence.
James Willis Stauffer,	C.E.,	South Bethlehem.
Martin Shaaff Stockett,	Clas.,	Pottsville.
Edmund Harrison Symington,	M.E.,	Baltimore, Md.
William Ulrich, jr.,	A.C.,	Bethlehem.
Charles Bartlett Warren,	M.E.,	Westfield, Mass.
Levi Watts, jr.,	E.E.,	Terre Hill.
Charles Edward Webster, jr.,	Clas.,	South Bethlehem.
Frederick Charles Wettlaufer,	A.C.,	New York City.
Theodore Benjamin Wood,	M.E.,	Chambersburg.
William Bell Wood,	M.E.,	Baltimore, Md.
Lawrence Wooden,	C.E.,	Hampstead, Md.
Warren Worthington,	M.E.,	Rushland.
Samuel Augustus Yorks, jr.,	E.E.,	Danville.
Harry Statten Zimmerman,	C.E.,	State Line.

SOPHOMORE CLASS.

	Course.	Residence.
G. Fred Allen,	C.E.,	Florida, N. Y.
Leon Whetstone Bailey,	E.E.,	Delano.
Richard Charles Becerra,	A.C.,	Caracas, Venezuela.
Maurice Clark Benedict,	M.E.,	Altoona.
Arthur Knode Birch,	E.E.,	Washington, D.C.
Frank Elliott Bradenbaugh,	M.E.,	Parkersburg, W.Va.
John Morgan Buckland,	Sci.,	Hokendauqua.
José Fernando Capriles,	C.E.,	Puerto Cabello, Vene-
Charles Ford Carman,	C.E.,	Cedarville, N.J. [zuela.
Bernard Todd Converse,	M.E.,	Louisville, Ky.
John Peter Croll,	C.E.,	Trexlertown.
Rudolph Degener,	M.E.,	New York City.
Joseph K. Ellenbogen,	L.S.,	Allentown.
James Chickering England,	E.E.,	Washington, N.J.
Robert Farnham, jr.,	C.E.,	Washington, D.C.
José Gervasio Gandia,	C.E.,	Puerta de Tierra, Porto Rico.
J. Walter Gannon,	C.E.,	New Brighton, S.I.
James Henry Gledhill,	M.E.,	Riegelsville.

	Course.	Residence.
Eugene Gifford Grace,	E.E.,	Goshen, N.J.
John Wesley Grace, jr.,	E.E.,	Goshen, N.J.
Oscar Cooper Hannum,	C.E.,	Philadelphia.
George Duncan Heisey,	E.M.,	Pittsburg.
Paul Gerhard Ludiger Hilken,	M.E.,	Baltimore, Md.
James Cuthbert Holderness,	E.E.,	Cambridge, Mass.
George Augustus Horne,	A.C.,	Plainfield, N.J.
Roy Rhodes Hornor,	E.M.,	Clarkesburg, W.Va.
George Reifsnyder Jackson,	C.E.,	Scranton.
Harry Reese James,	M.E.,	Braddock.
Edward Allen Keys,	C.E.,	Linden, Md.
Russell Kimball,	M.E.,	New York City.
Arthur Warner Klein,	M.E.,	Bethlehem.
Clark Miles Knight,	M.E.,	Bethlehem.
Harry Edward Knight,	Sci.,	New York City.
Richard Skerrett Landron,	C.E.,	Puerta de Tierra, Porto Rico.
George Craig Leidy,	C.E.,	Washington, D.C.
Newton Wambold Leidy,	E.E.,	West Bethlehem.
Garth Bainbridge Luten,	C.E.,	Cayce, Ky.
Charles Michael Masson,	M.E.,	Rheims, N.Y.
William Lathrop Meaker,	A.C.,	South Bethlehem.
James Flanders Middledith,	M.E.,	Plainfield, N.J.
Robert Hopkins Moffitt, jr.,	E.M.,	Harrisburg.
J. Foster Morgan,	E.E.,	Harwood Mines.
Charles Souders Padget,	Arch.,	Bethlehem.
Henry Ralph Palmer,	M.E.,	West Chester.
John Read Pettit,	E.M.,	Philadelphia.
William Piez,	M.E.,	New York City.
Louis Thomas Rainey,	E.E.,	Decatur, Ill.
James Burr Reddig,	M.E.,	Shippensburg.
Percy Lesley Reed,	C.E.,	Altoona.
Victor Hugo Reid,	C.E.,	Brooklyn, N.Y.
Howard Albert Riegel,	C.E.,	Bethlehem.
George Loomis Robinson,	C.E.,	Elmira, N.Y.
Gustavo Rovelo,	M.E.,	Comitan-Chiapas, Mex
Oliverio Sanchez,	C.E.,	Nuevitas, Cuba.
Abraham Shimer,	M.E.,	West Bethlehem.

	Course.	Residence.
Robert Sargent Shriver,	Arch.,	Cumberland, Md.
William Harold Speirs,	E.E.,	St. Louis, Mo.
Abram Peters Steckel,	E.E.,	Lykens.
Robert Maximilian Straub,	C.E.,	Pittsburg.
William Wharton Thurston,	E.M.,	South Bethlehem.
Laurens Van Benthem,	E.E.,	The Hague, Holland.
John Sage Viehe,	E.E.,	Vincennes, Ind.
Theodore Cuyler Visscher,	C.E.,	Rome, N.Y.
Joseph D. Wentling,	C.E.,	Greensburg.
David Sheibley Wert,	E.E.,	Carlisle.
Harry Anderson Wilcox,	C.E.,	West Granby, Conn.
George Bassett Williams,	Arch.,	Washington, D.C.
George Herbert Wood,	M.E.,	Chambersburg.
Wright Youtsey,	E.M.,	Newport, Ky.

FRESHMAN CLASS.

	COURSE.	RESIDENCE.
Louis Benjamin Abbott,	M.E.,	Carbondale.
Raymond Claud Albright,	E.E.,	Allentown.
George Krieble Anders,	E.E.,	Lansdale.
Arthur Benjamin Anderson,	E.E.,	Philadelphia.
George William Barager,	M.E.,	Hazleton.
Paul Weiss Barber,	M.E.,	Bethlehem.
Wallace Edgar Bartholomew,	C.E.,	Richlandtown.
Albert William Bayard,	M.E.,	Washington, D.C.
Berthold Graeff Beck,	E.E.,	West Bethlehem.
Thomas Francis Bell,	M.E.,	Shenandoah.
John Francis Benson,	C.E.,	Portsmouth, Va.
Edwin Percy Bigelow,	E.E.,	Oxford, N.J.
Marmion Stanley Black,	A.C.,	Swedesboro, N.J.
James Raymond Boak,	E.E.,	Hughesville.
Russell Julian Borhek,	M.E.,	West Bethlehem.
Reginald Welles Bours,	C.E.,	Jacksonville, Fla.
John Hall Bower,	E.M.,	Myerstown.
Henry Lawton Bowers,	A.C.,	Rome, N.Y.
Andrew Thomas Brice,	E.E.,	New York City.

	Course.	Residence.
John James Brice,	C.E.,	New York City.
Joseph William Burke,	C.E.,	Shenandoah.
Marshall Greene Candee,	E.E.,	Washington, D.C.
David Hastings Canfield,	Arch.,	Middletown, N.Y.
Morrow Chamberlain,	E.M.,	Chattanooga, Tenn.
Hugh Banks Chapman,	E.E.,	St. Elmo, Tenn.
George Ralph Coffin,	A.C.,	Bradford.
Richard Cromwell Congdon,	M.E.,	Baltimore, Md.
Robert Milton Cortright,	E.E.,	Bethlehem.
George Curtis Coutant,	E.E.,	High Falls, N.Y.
George Hooper Day,	E.E.,	Batavia, N.Y.
John Kenelm Digby,	E.M.,	London, England.
Herbert C. Dilliard,	E.E.,	East Bangor.
Raymond Aloysius Dinan,	A.C.,	South Bethlehem.
Alan Craig Dodson,	L.S.,	Bethlehem.
Truman Monroe Dodson, 2d,	E.M.,	Bethlehem.
Gavin Hogg Dortch,	M.E.,	Goldsboro, N.C.
William T. Drake,	M.E.,	Old Forge.
Nimson Eckert,	Clas.,	Allentown.
Charles Albion Emerson,	E.E.,	Summerville, S.C.
John William Fletcher,	M.E.,	Skowhegan, Me.
Theodore Frederic Forbes,	A.C.,	Fort McPherson, Ga.
Donald Calvert Fugitt,	M.E.,	Washington, D.C.
John Fuller,	M.E.,	Quarryville, N.J.
Frank Giering,	M.E.,	Bethlehem.
Author Hendrix Gill,	E.E.,	Boring, Md.
George C. D. Goldsmith,	C.E.,	Catasauqua.
Herbert Terry Greene,	E.M.,	Montclair, N.J.
Frederick Augustus Groff,	E.E.,	Rome, N.Y.
Charles Frederick Gross,	C.E.,	Belvidere, N.J.
William B. Grubbe,	C.E.,	Pine Plains, N.Y.
Arthur Bradley Hanscom,	C.E.,	Philadelphia.
Edmund Franklin Harmony,	A.C.,	Allentown.
Ernest Warfel Haverstick,	E.E.,	Lancaster.
Austin Diehl Heller,	L.S.,	Hellertown.
Albert Darby Hollingsworth,	Arch.,	Scotch Plains, N.J.
Michael James Honan,	E.E.,	Oxford, N.J.
Edward Melville Huggins,	E.E.,	Nevis, British W.I.

	Course.	Residence.
Lloyd Jones Iredell,	Sci.,	Allentown.
Clarence Peter Kennedy,	Sci.,	Buffalo, N.Y.
Elliott Bosworth Kitchell,	E.E.,	South Orange, N.J.
Paul Kline,	C.E.,	Pittsburg.
Frank Jones Laubenstein,	Sci.,	Ashland.
Mason Benedict Lawton,	A.C.,	Rome, N.Y.
John Edward Leibfried,	A.C.,	Bethlehem.
William Grant Lessig,	E.E.,	Shenandoah.
Herbert Spencer Lewis,	C.E.,	Baltimore, Md.
Thomas Windle Lukens,	E.M.,	Atglen.
Charles Edward Terry Lull,	E.M.,	Trenton, N.J.
William Thomas McCarthy,	Arch.,	Rome, N.Y.
Kenneth Wesley McComas,	A.C.,	South Bethlehem.
David Graham McGavock,	E.E.,	Graham's Forge, Va.
Johnson McVeigh,	A.C.,	New York City.
William George McVeigh,	C.E.,	New York City.
Carl Edward Maeder,	M.E.,	Pittsburg.
Harry Ivins Magee,	C.E.,	Philadelphia.
William Elston Magie,	M.E.,	New York City.
Joseph Patrick Martin,	C.E.,	Plymouth.
J. Louis Meixell,	E.E.,	Parsons, Kan.
Harry Maxwell Menner,	A.C.,	Bethlehem.
Manuel de la Mora,	C.E.,	Guadalajara, Mex.
Robert C. Morris, jr.,	M.E.,	Pottsville.
George Rohrer Morrow,	A.C.,	Highspire.
Harry Tilghman Ochs,	E.E.,	Allentown.
Louis Ortner,	M.E.,	Drifton.
Arthur Rose Parsons,	E.M.,	Salt Lake City, Utah.
Frederick Jay Payne,	M.E.,	Copenhagen, N.Y.
John Hazelrod Pomeroy,	E.E.,	Ridley Park.
Norman S. Powell,	E.M.,	West Middlesex.
Joseph Jacob Reamer,	C.E.,	Waterloo, N.Y.
John Nicholas Reese,	E.E.,	Harrisburg.
Alexander Duffield Robb,	A.C.,	Phœnixville.
Walter Henry Rodney,	C.E.,	Baltimore, Md.
Ferdinand W. Roebling, jr.,	M.E.,	Trenton, N.J.
James George Ross,	C.E.,	Kittanning.
Charles Edward Rowe,	M.E.,	Philadelphia.

	Course.	Residence.
Armando Sanchez,	E.M.,	Nuevitas, Cuba.
Alfredo J. Sanchez,	A.C.,	Matanzas, Cuba.
Edmund Trowbridge Satchell,	A.C.,	Lancaster.
Martin Schwerin,	E.M.,	New York City.
Carlos Nathaniel Scovil,	M.E.,	Copenhagen, N.Y.
Harvey Simon Seiple,	M.E.,	Bethlehem.
Joseph Stauffer Shultz,	C.E.,	Washington Boro.
Clayton Miller Simmers,	C.E.,	Phœnixville.
Charles Sylvanus Snyder,	A.C.,	South Bethlehem.
Arturo Solórzano,	M.E.,	Managua, Nicaragua.
William Paul Starkey,	M.E.,	Bustleton.
Herbert Spencer Stauffer,	M.E.,	South Bethlehem.
John Alvin Strauss,	E.E.,	Sayre.
Henry A. Tobelmann, jr.,	A.C.,	Newark, N.J.
Arthur W. T. Turner,	M.E.,	Amherst, Mass.
John Ralph VanDuyne,	C.E.,	Newark, N.J.
Bertil Von Philp,	M.E.,	West Bethlehem.
Richard Ambrose Warner,	E.M.,	Washington, D.C.
William Penn White,	E.E.,	Washington, D.C.
William Townsend White,	Arch.,	Williamsport.
Lloyd Wilcoxon,	M.E.,	Freeport, Ill.
Toros Kurk Yasharian,	E.E.,	Hedjin, Asia Minor, Turkey.
Edward Robins Zalinski,	E.M.,	Medina, N.Y.

SPECIAL STUDENTS.

	Course.	Residence.
Thomas Micks Clinton,	E.E.,	Baltimore, Md.
George Duncan Heisey,	E.M.,	Pittsburg.
Francis Betts Smith,	M.E.,	Hartford, Conn.
Brigham Smoot,	A.C.,	Provo City, Utah.
Harry Wellington Thatcher,	A.C.,	South Bethlehem.

SUMMARY OF STUDENTS BY STATES.

Maine,	1
Massachusetts,	4
Connecticut,	6
New York,	43
New Jersey,	30
Pennsylvania,	174
Delaware,	1
Maryland,	20
District of Columbia,	17
Virginia,	7
West Virginia,	5
North Carolina,	2
South Carolina,	6
Georgia,	1
Florida,	2
Kentucky,	4
Tennessee,	2
Ohio,	1
Indiana,	2
Illinois,	7
Iowa,	2
Missouri,	1
Kansas,	1
Utah,	2
Mexico,	8
Cuba,	5

Porto Rico,	2
British West Indies,	1
Nicaragua,	1
Republic of Colombia,	1
Venezuela,	2
England,	1
Holland,	1
Macedonia,	1
Turkey,	1
	365

SUMMARY OF STUDENTS BY CLASSES AND COURSES.

	Graduates.	Seniors.	Juniors.	Sophomores.	Freshmen.	Specials.	Totals.
Classical,	7	—	4	—	1	—	12
Latin-Scientific,	—	—	—	1	2	—	3
Science and Letters,	1	—	—	2	3	—	6
Civil Engineering,	1	20	20	22	21	—	84
Mechanical Eng.,	3	22	24	18	28	1	96
Mining Eng.,	3	10	4	6	13	1	37
Electrical Eng.,	1	23	17	14	29	1	85
Analytical Chem.,	2	3	8	3	16	2	34
Architecture,	—	—	—	3	5	—	8
Totals,	18	78	77	69	118	5	365

ALUMNI

OF THE

LEHIGH UNIVERSITY.

CLASS OF 1869.

*J. Haynes Hinds Corbin, A.C.

Charles Edward Ronaldson, M.E., The Geo. V. Cresson Co., Room 214, 136 Liberty Street, New York City. Residence: Zeta Psi Club, 148 W. 34th St.

Miles Rock, C.E., Astronomer, Chief Engineer, and President of the Boundary Commission of Guatemala with Mexico, Guatemala City, Central America.

CLASS OF 1870.

*Lehman Preston Ashmead, A.C., M.D.

Richard Brodhead, M.E., Attorney-at-Law, 32 Nassau Street, New York City.

William R. Butler, M.E., Mauch Chunk, Pa.

George A. Jenkins, A.C., Bethlehem Iron Co., South Bethlehem, Pa.

William J. Kerr, A.C., M.E., Supt. Motive Power, Union Traction Co., Ninth and Dauphin Sts., Philadelphia, Pa. Residence: 1010 South 49th St.

*Harry E. Packer, A.C.

Henry R. Price, C.E., M.D., Practicing Physician, 485 Franklin Avenue, Brooklyn, N.Y.

Henry B. Reed, B.A., M.D., Practicing Physician, 545 Franklin Avenue, Brooklyn, N.Y.

*William Dunlop Ronaldson, B.A., M.D.

John M. Thome, C.E., Ph.D., Director National Astronomical Observatory, Cordova, Argentine Republic, S.A.

*Russel B. Yates, C.E.

* Deceased.

CLASS OF 1871.

Jacob Neff Barr, M.E., Superintendent Motive Power, Chicago, Milwaukee & St. Paul Ry., 3028 Wells Street, Milwaukee, Wis.

Frank Laurent Clerc, C.E., Mining, Philipsburg, Pa.

Henry S. Drinker, E.M., Lawyer; General Solicitor and Assistant to the President of the Lehigh Valley Railroad Co., 228 South Third Street, Philadelphia, Pa. Residence: Haverford, Pa.

Edward F. Fassitt, A.C., 5505 Chew Street, Germantown, Pa.

William Hull MacCarthy, B.A., Secretary of the White Mfg. Co., Globe Iron Works, 556 West 34th Street, New York City.

Waldron Shapleigh, A.C., Chemist, Welsbach Light Company, Gloucester City, N.J. Residence: 2223 Trinity Place, Philadelphia, Pa.

*Charles G. Weaver, C.E.

CLASS OF 1872.

George Pierrepont Bland, C.E., Civil Engineer, of the firm of Bailey, Milliken & Bland, Limited. Residence: 3220 Woodland Avenue, Philadelphia, Pa.

Daniel P. Bruner, C.E., Civil Engineer, Architect, and Builder, 501 W. Chelten Ave., Germantown, Philadelphia, Pa.

Henry St. Leger Coppée, C.E., U. S. Assistant Engineer, Greenville, Miss.

*F. R. Christian Degenhart, A.C.

Harvey S. Houskeeper, B.A., Principal of State Academy, Brookeville, Md.

*Lentz Edmund Klotz, C.E.

Oscar Moore Lance, A.C., Asst. General Manager, Spring Brook Water Supply Co., Wilkes-Barre, Pa. Residence: Plymouth, Pa.

Raymundo Floresta de Miranda, C.E., Division Engineer, Rio de Janeiro and Northern R. R. Address: E. F. Principe de Grao Pará, Estaçaodo Areal, Rio de Janeiro, Brazil.

*Deceased.

James S. Polhemus, C.E., Assistant U. S. Engineer, in local charge Coos Bay Harbor Improvements, Empire, Oregon.

Henry D. Scudder, C.E., Lumber and Coal, 344 Perry Street, Trenton, N.J.

CLASS OF 1873.

Washington Hopkins Baker, A.C., M.D., Physician and Life Insurance Examiner, 1610 Summer Street, Philadelphia, Pa.

Robert B. Claxton, C.E., 5116 Newhall St., Germantown, or University Club, Philadelphia, Pa.

James Peyton Stuart Lawrance, M.E., Chief Engineer U.S. Navy, Inspector of Machinery for U.S. Navy, Newport News Shipbuilding and Dry Dock Co., Newport News, Va. Permanent address: care of Navy Department, Washington, D.C.

Hildebrando Barjona de Miranda, A.C., Professor of English, Lyceo Paraence, Belém do Pará, Estades Unidos do Brazil.

Wallace McIlvaine Scudder, M.E., Publisher Newark *Evening News*, 215 Market Street, Newark, N.J. Residence: 10 Washington Place.

CLASS OF 1874.

Caspar Wistar Haines, A.M. (Haverford '72), C.E., Railway and Consulting Engineer, 26 South 15th Street, Philadelphia, Pa.

William Davis Hartshorne, C.E., Superintendent Worsted Department, Arlington Mills, Lawrence, Mass. Residence: 40 Pleasant Street, Methuen, Mass.

Allen A. Herr, C.E., Real Estate and Insurance Agent, 108 East King Street, Lancaster, Pa.

Thomas Merritt, C.E., Manager Mutual Life Insurance Co. of New York, 31-32-33 Canadian Bank of Commerce Building, Toronto, Can.

William Marshall Rees, C.E., First Assistant Engineer, Mississippi River Improvement, Appeal Building, Memphis, Tenn.

CLASS OF 1875.

Charles Julius Bechdolt, C.E., Superintendent Central Division P., W. & B. R. R., Media, Pa.

Antonio M. Cañadas, A.C., Chemist, Loja, Ecuador.

John F. Halbach, B.A., B.M., Attorney-at-Law, 1218–1220 Filbert Street, Philadelphia, Pa.

William Arthur Lathrop, C.E., General Superintendent Lehigh Valley Coal Co., Wilkes-Barre, Pa.

Arthur E. Meaker, C.E., Instructor in Mathematics, Lehigh University. Residence: 514 Cherokee Street, South Bethlehem, Pa.

Joseph Morrison, C.E., Resident Engineer for Lines west of the Mississippi River, The Wabash Railroad Co. Residence: 401 S. Clark Street, Moberly, Mo.

Francis Sebastian Pecke, C.E., Chief Engineer, N. Y. and N. J. Water Co.; Engineer, Hydraulic Construction Co., 145 Broadway, New York City. Residence: 65 S. Parsons Ave., Flushing, N.Y.

Edward H. Williams, jr., B.A. (Yale), A.C., E.M. ('76), F. G.S.A., Professor of Mining and Geology, Lehigh University. Residence: 117 Church Street, Bethlehem, Pa.

*Carl F. Zogbaum, C.E.

CLASS OF 1876.

Frank C. Angle, C.E., Attorney-at-Law, Danville, Montour Co., Pa.

*James DeWitt Carson, C.E.

*Thomas William Frederick, M.E.

William Griffith, C.E., Mining Engineer and Coal Specialist, Coal Exchange, Scranton, Pa. Residence: 405 Susquehanna Ave., West Pittston, Pa.

C. William Macfarlane, C.E., Ph.D. (Freiberg i. B. '93).

Robert W. Mahon, C.E., Ph.D. (Johns Hopkins), Monongahela Furnace Co., McKeesport, Pa.

J. J. de Gama Malcher, M.E.

Walter Percival Rice, C.E., Civil Engineer, The Walter P. Rice Engineering Company, 545 Society for Savings Building, Cleveland, Ohio. Residence: 293 Euclid Ave.

* Deceased.

Henry Richards, E.M., Contractor, Dover, N.J.
Lowdon W. Richards, M.E., Columbia, Pa.
Charles L. Taylor, E.M., Assistant Secretary The Carnegie Co., Limited, 48 Fifth Ave., Pittsburg, Pa.

CLASS OF 1877.

John Eagley, C.E., North Springfield, Erie Co., Pa.
Percival D. Giess, C.E., Bethlehem, Pa.
Andrew M. Glassel, C.E., Bowling Green, Va.
George M. Heller, C.E., Bridge Engineer, 853 North 20th Street, Philadelphia, Pa.
Henry Sylvester Jacoby, C.E., Associate Professor of Civil Engineering, in charge of Bridge Engineering and Graphics, Cornell University. Residence: 7 Reservoir Avenue, Ithaca, N.Y.
James Fremont Marsteller, C.E., Superintendent, Snow Shoe Division, Lehigh Valley Coal Co., Snow Shoe, Centre Co., Pa.
*Seizo Miyahara, C.E.
Charles R. Rauch, A.C., Central Hotel, Bethlehem, Pa.
Lewis Theodore Wolle, C.E., Secretary of the Cambria Mining Co., Cambria, Weston Co., Wyoming.

CLASS OF 1878.

Charles Bull, M.E., Assistant Librarian and Bursar, General Theological Seminary, Chelsea Square, New York City.
*James E. Gilbert, C.E.
William Convers Hazlett, M.E., Architect, 151 Broadway, New York City.
Frank Perley Howe, B.A. (Brown), E.M., President, The North Branch Steel Co.; Vice-President, Wm. Wharton, jr., & Co., Inc. Residence: 251 South 17th Street, Philadelphia, Pa.

* Deceased.

Nathaniel Lafon, M.E., Engineer for Bird Eye-Jellico Coal Co., Halsey, Whitley Co., Ky.

Benjamin B. Nostrand, jr., M.E., Electrical Engineer, The Westinghouse Electric and Manufacturing Co.; Treasurer and Manager, The Sing Sing Electric Lighting Co.; President and Treasurer, The Peekskill Electric Light and Power Co., Peekskill, N.Y.

Milnor Peck Paret, C.E., Resident Engineer, Kansas City Terminal Construction Company, Lake Charles, La.

Holbrook Fitz John Porter, M.E., General Western Sales Agent for the Bethlehem Iron Co., Room 1433 Marquette Building, Chicago, Ill. Residence: 4214 Berkeley Avenue.

William K. Randolph, C.E.

Robert H. Read, B.A., Counsellor and Expert in Patent Causes, 44 Broad Street, New York City.

Henry Church Wilson, C.E., Chief Clerk, U. S. Engineer Office, Telephone Building, Galveston, Texas.

CLASS OF 1879.

James S. Cunningham, M.E., Chief Engineer, Berwind-White Coal Mining Co., Tyrone, Pa.

*Joseph Hill Paddock, M.E.

Fitz William Sargent, C.E., General Agent The Sargent Co., 675 Old Colony Building, Chicago, Ill. Residence: The Irving, 308 N. State Street.

Richard Hawley Tucker, C.E., Astronomer, Lick Observatory, Mt. Hamilton, Cal.

CLASS OF 1880.

Abraham Bruner, E.M., Civil Engineer, Assistant Engineer, Norfolk & Western R.R., Crewe, Nottoway Co., Va.

Murray Morris Duncan, A.C., E.M. ('80), General Manager Antrim Iron Company, Mancelona, Mich.

*Deceased.

Thomas Hughlett Hardcastle, B.A., M.A. ('82), LL.B., Attorney-at-Law, 816 Boston Building, Denver, Col. Residence: 1042 Pearl Street.

John Tinsley Jeter, E.M., Superintendent of the Keystone Coal Co., Wilkes-Barre, Pa. Residence: 222 S. Franklin St.

Charles Francis King, A.C.

George Ernest Potter, C.E., Assistant Engineer, New York, Chicago & St. Louis R. R., 151 Wayne Street, Ft. Wayne, Ind.

Frederick Putnam Spalding, C.E., Assistant Professor of Civil Engineering, Cornell University, Ithaca, N. Y. Residence: 159 E. Seneca St.

Leonard Blakeslee Treharne, B.A., Editorial Department, *New York Times*, New York City.

Benjamin Russell Van Kirk, M.E., Locomotive Designer, Baldwin Locomotive Works, 2105 Green Street, Philadelphia, Pa.

*Frederick Copeland Wooten, M.E.

CLASS OF 1881.

William Simon Cranz, A.C.

Alexander Patrick Crilly, B.A., Allentown, Pa.

Thomas Morgan Eynon, M.E., General Manager, The Eynon-Evans Mfg. Co., 15th and Clearfield Streets, Philadelphia, Pa. Residence: 3102 N. Fifteenth St.

Charles Weed Gray, A.C.

Benjamin Franklin Haldeman, E.M., Superintendent, Open Hearth Department, Cambria Iron Co., Johnstown, Pa. Residence: Fayette Street, Westmont, Johnstown.

Lewis Stockton, B.A., Counselor-at-Law, Erie Bank Building, Cor. Niagara and Main Streets, Buffalo, N. Y. Residence: Cor. North and Franklin Streets.

CLASS OF 1882.

Louis Oscar Emmerich, E.M., Mining Engineer, Hazleton, Pa.

*Deceased.

Charles Comstock Hopkins, B.S. (Sci.), C.E. ('84), member of firm of The Stanwix Engineering Co., Hydraulic and Sanitary Engineers, Rome, N.Y.

Elmer Henry Lawall, C.E., General Superintendent Lehigh & Wilkes-Barre Coal Co., Wilkes-Barre, Pa. Residence: 133 S. Franklin St.

Robert Thomas Morrow, C.E., Assistant Engineer, Elmira and Canandaigua Divisions, N. C. Ry., Elmira, N. Y. Residence: 702 Park Place.

Eugene Ricksecker, C.E., Civil Engineer, and U.S. Assistant Engineer in local charge of fortifications and defences of Puget Sound, 602 Burke Building, Seattle, Washington. Address: P. O. Box 289.

John Dougherty Ruff, E.M., 328 South 21st Street, Philadelphia, Pa.

*Samuel Brenton Sickler, C.E.

Martin Wittmer, E.M., Superintendent Wittmer Brick Co., Limited, Glen Shaw, Allegheny Co., Pa.

CLASS OF 1883.

*Enos Kellar Bachman, E.M.

Walter Briggs, B.A., Attorney-at-Law, Commonwealth Building, Scranton, Pa. Residence: 1505 Adams Ave.

Henry Augustus Butler, B.S. (Sci.), Secretary and Treasurer, Carbon Iron and Steel Co., Limited, Mauch Chunk, Pa.

Hedley Vicars Cooke, B.A., LL.M. (Columbian University), Attorney-at-Law, Union Trust Building, 707 Olive St., St. Louis, Mo. Residence: Normandy, Mo.

Francis Joseph Crilly, B.A., M.A. ('89), Special Deputy Collector of the Port, Customs House, Philadelphia. Residence: 1926 Spring Garden Street.

Francis Wharton Dalrymple, C.E., City Engineer, 131 Main Street, Hornellsville, N.Y.

Timothy James Donahoe, A.C., Benson Mines, N. Y.

George Francis Duck, E.M., Consulting Mining Engineer, P. O. Box 825, Pittsburg, Pa.

*Deceased.

Alfred Edmond Forstall, M.E., Assistant Superintendent, The Newark Gas Co., Jersey Street Gas Works, Newark, N.J. Residence: 63 Orchard St.

Nathaniel Oliver Goldsmith, M.E., Principal Engineer, The Weir Frog Co., Cincinnati, Ohio. Residence: 21 Somerset Building, Avondale.

William Theodore Goodnow, C.E., General Manager Cayuta Wheel and Foundry Co., and The Sayre Land and Water Co., Sayre, Pa.

John Daniel Hoffman, B.A., M.A. ('89), Counselor-at-Law, 17 Broad Street, Bethlehem, Pa. Residence: 30 N. Main Street.

George Gowen Hood, C.E., Civil Engineer, Mount Airy, Philadelphia, Pa.

Garrett Linderman Hoppes, C.E., Eagle Hotel, Bethlehem, Pa.

Julian de Bruyn Kops, jr., B.E. (University of Georgia), C.E., Assistant City Engineer, Savannah, Ga.

Preston Albert Lambert, B.A., M.A. ('91), Instructor in Mathematics, Lehigh University, South Bethlehem, Pa.

Edwin Francis Miller, M.E., with R. D. Wood & Co., Camden, N.J.

Rev. Wilson Franklin More, B.A., M.A. ('91), Pastor Salem Reformed Church, Catasauqua, Pa.

Nelson Morrow, M.E., Manager of the Deep Rock Mineral Springs, Oswego, N.Y. Residence: 235 W. First St.

Thomas Nicholson, M.E., with the Johnstown R.R. Frog and Switch Co., Chester, Pa.

George Spencer Patterson, E.M., Mining and Civil Engineer, Box 181, Terre Haute, Ind. Residence: 710 Ohio Street.

Rembrandt Richard Peale, B.S. (Sci.), Secretary and Treasurer, Bloomington Mining Co., 411–413 Walnut Street, Philadelphia, Pa.

Henry Allebach Porterfield, E.M., President and General Manager, The Dexter Spring and Gear Co., Inc., Pittsburg, Pa. Residence: 319 S. Hiland Avenue, E.E.

Francis Henry Purnell, C.E., E.M. ('86), Clerk of the Circuit Court, Worcester Co., Snow Hill, Md.

Jesse Wilford Reno, E.M., Rapid Transit Tunnel for New York City, The Reno Inclined Elevator Co., Mining Expert, Mills Building, New York City.

Charles Loomis Rogers, M.E., General Manager, Milton Car Works, Milton, Pa.

John Ruddle, M.E., General Supervisor, Canal Department, The Lehigh Coal and Navigation Co., Mauch Chunk, Pa.

Charles Henry Stinson, B.S. (Sci.), Attorney-at-Law, Norristown, Pa.

*Robert Stinson, B.S. (Sci.).

CLASS OF 1884.

Robert Grier Cooke, B.A., Journalist, with Harper & Brothers, Franklin Square, New York City. Residence: 24 E. 47th St.

Henry Bowman Douglas, B.M., E.M. ('85), Consulting Mining Engineer, Vinton Colliery Co., Vintondale, Cambria Co., Pa.

William Banks Foote, B.M., E.M. ('86), Etiwanda, San Bernardino Co., Cal.

Harry Tallman Harper, C.E., Assistant Engineer, Florence & Cripple Creek Railroad, Florence, Col.

Harry Hurd Hillegass, C.E., Civil Engineer, Reading, Pa.

Edwin Franklin Hofford, C.E., Lehighton, Pa.

John Andrew Jardine, B.M., E.M. ('85), Superintendent Mining Department, Watts Steel and Iron Syndicate, Ltd., Middlesboro, Ky. Mailing Address: Kenvil, Morris Co., N.J.

James Warner Kellogg, M.E., Manager of Isolated and Marine Sales, General Electric Co., Schenectady, N.Y.

David Garrett Kerr, B.M., Edgar Thomson Steel Works, Wilkinsburg, Pa.

Frederick Bowman Langston, C.E., Architect, 1239 Bedford Avenue, Brooklyn, N.Y.

*Deceased.

William Langston, C.E., with Dean & Westbrook, Bridge Engineers and Contractors, 136 Liberty St., New York City.

Robert Packer Linderman, Ph.B., President of the Bethlehem Iron Company; President of the Lehigh Valley National Bank. Residence: South Bethlehem, Pa.

Joseph Franklin Merkle, C.E., M.D. (Univ. of Pa., '94), Physician and Surgeon, Llewellyn, Pa.

Harry Krider Myers, C.E., Miner and Shipper of Clearfield Bituminous Coal, Osceola Mills, Clearfield Co., Pa. 3423 North 19th Street, Philadelphia, Pa.

Albino Rosendo Nuncio, M.E., 3d Officer of the Section of Agriculture and Patents of the Secretary of Fomento, City of Mexico, Mexico.

James Ward Packard, M.E., President, The Packard Electric Co., Manufacturers, Warren, O.

Alfred Scull Reeves, B.M., E.M. ('85), of the firm of Paul S. Reeves & Son, Manufacturers of Phosphor Bronze, Brass, Babbitt Metals, etc., 1415-1425 Catharine Street, Philadelphia, Pa. Residence: 21st Street and Delancey Place.

Barry Searle, A.C., Superintendent Deep Crown Gold Mine, Johannesburg, South African Republic. Permanent Address: care of R. S. Searle, Montrose, Pa.

Lewis Buckley Semple, B.A., M.A. ('91), Ph.D. (Princeton), Instructor in English, Lehigh University.

Augustus Parker Smith, M.E., Lawyer; specialty, Patent Litigation and Investigation of Patented Inventions. Office: American Tract Society's Building, 150 Nassau St., New York City. Residence: 126 Prospect Place, Brooklyn.

Murray Stewart, M.E., Motive-Power Department, Philadelphia, Wilmington & Baltimore R. R. Co., Wilmington, Del.

Richard Washington Walker, C.E., Engineer in Guatemalan Commission for Survey of Boundary between Guatemala and Mexico, Guatemala, Centro-America, or Glen Moore, Pa.

James Angus Watson, C.E., Patent Lawyer, 931 F Street, N.W., Washington, D. C. Residence: 1454 Howard Avenue.

CLASS OF 1885.

Warren Howard Allen, A.C., Clerk, Farmers' National Bank, Athens, Pa.

Harrison Link Auchmuty, C.E., Assistant Chief Engineer, H. C. Frick Coke Co., Loucks Ave., Scottdale, Pa.

Theodore Weld Birney, C.E., of the firm of A. A. and T. W. Birney, Attorneys-at-Law, 420 Fifth Street, N.W., Washington, D.C. Residence: Chevy Chase, Md.

Harry Luther Bowman, B.M., Roller, 32-inch Steel Plate Mill, Parks Bros. & Co., Limited: 5807 Walnut Street, E.E., Pittsburg, Pa.

William Harvey Cooke, B.A., M.D., 10 N. Munn Avenue, East Orange, N. J.

William Noble Edson, C.E.

*John Roberts Engelbert, C.E.

Felix Freyhold, C.E., Draughtsman, Bureau of Yards and Docks, Room 166, Navy Department, Washington, D.C. Residence: 236 First Street, S.E.

Irving Andrew Heikes, B.M., E.M. ('86), Superintendent of Schools, Plymouth, Pa.

David Kirk Nicholson, M.E., with the Carnegie Steel Co., Limited, Braddock, Pa.

*Fayette Brown Petersen, C.E.

John Bertsch Price, C.E., Cashier, First National Bank, Hazleton, Pa.

Harry William Rowley, M.E., Chief Draughtsman, The Dickson Manufacturing Co., Scranton, Pa. Residence: 411 Madison Avenue.

*Elliot Otis Smith, C.E.

Clarence Moncure Tolman, M.E., Engineer, care of Edward G. Stoiber, Silver Lake Mines, Silverton, Col. Address: P. O. Box 129.

*Deceased.

John R. Wagner, M.E., Superintendent of Motive Power, Delaware, Susquehanna & Schuylkill R. R.; also Superintendent of Tests of the Coxe Iron Mfg. Co. Residence: Drifton, Luzerne Co., Pa.

James Hollis Wells, C.E., Civil Engineer, with Clinton & Russel, Architects, 32 Nassau Street, New York City.

Cabell Whitehead, B. M., M. S. (Columbian Univ.), Assayer, Bureau of the Mint, Treasury Department, Washington, D.C. Residence: 1114 New Hampshire Avenue.

CLASS OF 1886.

George Rodney Booth, Ph.B., Attorney-at-Law, Cor. Brodhead Ave. and Fourth St., South Bethlehem, Pa. Residence: 410 Market St., Bethlehem, Pa.

Richard Singmaster Breinig, B.S., E.M. ('89), Engineer Department, Kansas Division, Union Pacific Ry., 12th and Liberty Streets, Kansas City, Mo. Residence: 1600 Park Avenue.

John Henry Brown, C.E., Assistant Engineer Chicago & Northwestern Railroad, Chicago, Ill. Residence: 1176 Washington Boulevard.

Charles Ellsworth Clapp, Ph.B., Attorney-at-Law, 837 New York Life Building, Omaha, Neb.

George Henry Cobb, M.E., Chief Engineer, New York Transit Co., Metzger Building, Elmira, N.Y. Residence: 313 College Avenue.

William Henry Dean, B.M., E.M. ('86), A.C. ('86), Analytical Chemist, and Professor of Chemistry, Harry Hillman Academy, 89 West River Street, Wilkes-Barre, Pa.

Frederick William Fink, C.E., of the firm of Gibson & Fink, Civil and Mining Engineers, U. S. Deputy Mineral Surveyors, 303 Carr Avenue, Cripple Creek, Col.

Robert Caldwell Gotwald, C.E., Civil Engineer and Architect, Springfield, O.

Lewis John Henry Grossart, C.E., Civil Engineer, with the Atlas Cement Co., Northampton, Pa. Office: 28 B. B. Building, Allentown, Pa. Residence: 513 Allen Street, Allentown.

Max S. Hanauer, A.C., Manager Union Assay Office, 152 S. W. Temple St., Salt Lake City, Utah. Residence: 1111 E. First South Street.

Solomon Jacob Harwi, C.E., Assistant Engineer, Marine Department, The Babcock & Wilcox Co., New York City. Residence: Flushing, N. Y.

Simeon Cole Hazelton, B.M., E.M. ('87), care of El Paso Smelting Works, El Paso, Texas.

Mark Antony De Wolfe Howe, jr., B.A., A.B. and A.M. (Harvard), Bristol, R.I.

Charles Alexander Junken, C.E., Computer on Gun Construction, Ordnance Office, War Department, Washington, D.C. Residence: 109 Second St., N.E.

Guadalupe Lopez de Lara, M.E., Principal in the Lopez de Lara Iron Works Co., Guadalajara, Jalisco, Mexico. Residence: Avenida Alcalde No. 8.

Charles Augustus Luckenbach, B.M., City Clerk, Los Angeles, Cal.; State Deputy Supreme Commander Knights of the Maccabees for California. Residence: 1266 Ionia Street, Angelino Heights. Business address: Room 2, City Hall.

William Anthony Lydon, B.M., E.M. ('87), President Lydon & Drews Co., Engineers and Contractors, 1441 Unity Building, 79 Dearborn St., Chicago, Ill. Residence: 2952 Indiana Avenue.

Paul Douglass Millholland, C.E., Electrical Contractor, 452½ Penn St., Reading, Pa. Residence: 1362 Mineral Spring Road.

Henry Gerber Reist, M.E., Mechanical and Electrical Engineer, with General Electric Co., Schenectady, N.Y. Residence: 5 South Church Street.

Joseph William Richards, A.C., M.S. ('91), Ph.D. ('93), Instructor in Metallurgy, Lehigh University. Residence: 203 Church Street, Bethlehem, Pa.

George Mann Richardson, A.C., Ph.D. (Johns Hopkins), Professor of Organic Chemistry, Leland Stanford, Jr., University, Stanford University, Cal.

*Augustus Stoughton Ross, M.E.

*George Arthur Ruddle, Ph.B.

William Heysham Sayre, jr., M.E., McDonald & Sayre, Railroad Contractors, South Bethlehem. Residence: 306 Wyandotte Street, South Bethlehem, Pa.

John Selmar Siebert, C.E., Instructor in Civil Engineering, Pennsylvania State College, State College, Pa.

John Henry Spengler, C.E., Assistant Engineer, Chicago Avenue Pumping Station, Chicago, Ill. Residence: 3700 Lake Avenue.

Edwin Stanton Stackhouse, B.M., E.M. ('87), General Business, Shickshinny, Pa.

Theodore Stevens, B.M., E.M. ('87), Electrical Engineer, Thames Iron Works & Shipbuilding Co., Limited, London. Residence: 71 Balaam Street, Plaistow, Essex, England.

Harry Eugene Stout, B.S. (in Mining and Metallurgy), Audenried, Pa.

*Joseph Kiddoo Surls, B.M.

Rev. William Patterson Taylor, B.A., Chaplain of St. Mary's Hall, Curate of St. Mary's Church, Instructor in Burlington College, Burlington, N.J. Residence: "Old Parsonage."

Harry Toulmin, Ph.B., M.D., Physician, 4009 Chestnut Street, Philadelphia, Pa.

Priestly Toulmin, B.M., E.M. ('87), Chief Engineer of Sloss Iron and Steel Company, and Superintendent of the Brookside Department, Brookside, Ala.

Curtis Hussey Veeder, M.E., President Veeder Manufacturing Co., Courant Building, 66 State St., Hartford, Conn. Residence: 8 Townley St.

*Deceased.

CLASS OF 1887.

Frank Fielding Amsden, B.S., E.M. ('89), Superintendent of the Missouri Furnace Co., Station B, St. Louis, Mo.

Robert Webb Barrell, B.M., E.M. ('88), Assistant Manager, Chloride Mining & Milling Co., and Maxwell Gold Mining Co., Haines, Baker Co., Oregon.

Alexander Bonnot, C.E., Alexander Street, Norfolk, Va.

Charles Austin Buck, A.C., Chief Chemist, Bethlehem Iron Co., South Bethlehem, Pa. Residence: 521 Locust Street, South Bethlehem.

Julian Carter Buckner, M.E., 1009 McCulloch Street, Baltimore, Md.

Benjamin Amos Cunningham, C.E., Division Engineer, L.V.R.R., Sayre, Pa.

Eugene Diven, M.E., of the firm of Diven & Redfield, Attorneys and Counselors-at-Law, Elmira, N. Y. Residence: 212 E. Water St.

Alfred Doolittle, B.A., Assistant, Nautical Almanac Office, Office, Washington, D. C. Residence: 7 Cooke Place, N. W.

Francis Rouad Dravo, M.E., Assistant Engineer, Mackintosh, Hemphill & Co., Pittsburg, Pa. Residence: Edgeworth, Sewickley P.O., Pa.

Milton Henry Fehnel, B.S. (Sci.), A.C. ('89), Assistant Chemist at the Spreckels Refinery of the American Sugar Refining Co., Philadelphia, Pa. Residence: 265 South 9th Street.

Rev. Harvey Sheafe Fisher, B.A., B.D. (General Theological Seminary), Rector of St. Andrew's Church, Buffalo, N.Y. Residence: 380 Franklin Street.

Kenneth Frazier, B.A., Artist, 3 Washington Square, New York City.

*Henry Stevens Haines, M.E.

John Benjamin Hittell, C.E. '87, Assistant Engineer, Bureau of Streets, 217 City Hall, Chicago, Ill. Residence: 1746 Wrightwood Avenue.

John Myers Howard, M.E., Forge Superintendent, Latrobe Steel Company, Latrobe, Pa.

*Deceased.

ing Co., Hydraulic and Sanitary Engineers, Rome, N.Y.

Frederick Hayes Knorr, A.C., Traveling Auditor, Union Ice Co. of California. Residence; Los Angeles, Cal.

John Walter Ledoux, C.E., A.S.C.E., Chief Engineer, The American Pipe Mfg. Co., 1319 Filbert Street, Philadelphia, Pa. Residence: Swarthmore.

*Samuel Davis Langdon, M.E.

Garrett Brodhead Linderman, Ph.B., Coal Operator, South Bethlehem, Pa.

Harry Smuller Meily, C.E., Assistant Supervisor, P.R.R., Huntingdon, Pa.

James Alexander Morrow, C.E., Hydraulic Engineer, American Water Works and Guarantee Co., Limited, Lewis Block, Pittsburg, Pa.

Henry Benjamin Charles Nitze, B.S., E.M. ('88), Mining Engineer and Geologist, Wetherill Concentrating Co., South Bethlehem, Pa. Permanent address: care Robt. Garrett & Sons, Baltimore, Md.

George Francis Pettinos, M.E., Senior member of the firm of Pettinos Brothers, Miners and Refiners of Graphite, and Manufacturers of Foundry Facings, Bethlehem, Pa. Residence: 436 Cherokee Street, South Bethlehem.

Robert Henry Phillips, C.E., Manager, Washington, Arlington & Falls Church Ry. Co., Washington, D. C. Residence: 3342 M Street.

Rufus King Polk, B.S., E.M. ('88), General Manager North Branch Steel Co., Danville, Pa. Residence: 6 Walnut Street.

Charles Pope Pollak, C.E., Traveling Salesman, Railway Supply Department, Fairbanks, Morse & Co., Chicago, Ill. Permanent address: 1129 N. Grand Avenue, St. Louis, Mo.

*Deceased.

Mason Delano Pratt, C.E., Street Railway Engineer, Pennsylvania Steel Co., Steelton, Pa.

Evan Turner Reisler, C.E., Roadmaster, Delaware Division, New York, Lake Erie & Western R. R., Port Jervis, N.Y. Residence: 50 E. Main Street.

George Thomas Richards, C.E., Engineer for The Drake and Stratton Co., Contractors, Conestoga Building, Pittsburg, Pa.

*John Warwick Scull, M.E.

Frank Stuart Smith, A.C., Manager Sawyer-Man Electric Co., Pittsburg, Pa. Residence: 4512 Centre Ave.

Elmer Ellis Snyder, C.E., Roadmaster, Nashville & Decatur Division, and Nashville, Florence & Sheffield Ry., Louisville & Nashville R. R., Columbia, Tenn.

Harry Harkness Stoek, B.S., E.M. ('88), Assistant Professor of Mining Engineering and Metallurgy, Pennsylvania State College, State College, Pa.

*Otway Owen Terrell, M.E.

Edward Power Van Kirk, B.M., Electrical Engineer, Elizabeth, Pa.

August Julius Wiechardt, M.E., Professor of Mechanic Arts, Agricultural College, Miss.

Henry August Julius Wilkens, B.S., E.M. ('88), General Manager, Wetherill Concentrating Co., South Bethlehem, Pa.

Frank Williams, B.S., E.M. ('88), Manager Basic Brick Co., and Fayette Manufacturing Co., Johnstown, Pa. Permanent Address: 816 Lewis Block, Pittsburg, Pa.

Nissley Joseph Witmer, C.E., Draughtsman, Dept. of Public Works of Philadelphia. Address: 4534 Frankford Avenue, Philadelphia, Pa.

Hampton Woods, B.S. (Sci.), B.M. ('88), E.M. ('89), Consulting Metallurgist and Engineer, 212 Bullitt Building, Philadelphia, Pa.

George Frederic Yost, M.E., Draughtsman, L. V. Coal Co., Wilkes-Barre, Pa.

Charles F. Zimmele, Ph.B., Principal Bradley School, 205 Ninth Street, S.W., Washington, D. C.

* Deceased.

CLASS OF 1888.

Charles Lambert Addison, M.E., Signal Engineer, Long Island Railroad, Long Island City, N.Y. Residence: Hempstead, N.Y.

George Reade Baldwin, M.E., Manager of The Baldwin Electric Meter Co., Washington, D.C.

Charles Lincoln Banks, B.S. (Sci.), M.D., Physician and Surgeon, 254 State Street, Bridgeport, Conn.

Edmund A. Bates, C.E., Draughtsman, Norton Iron Co., East Everett, Mass. Residence: 45 W. Newton Street, Boston.

William Donaldson Beatty, C.E., Assistant Engineer, Philadelphia & Reading R.R. Address: Chief Engineer's Office, Reading Terminal, Philadelphia, Pa.

Hubert Alexander Bonzano, C.E., Civil Engineer and Contractor, 331 South 18th Street, Philadelphia.

William Bradford, C.E., Engineer Citizens' Traction Co., 142 South Negley Ave., Pittsburg, Pa.

Adolph Theodore Bruegel, M.E., M.M.E. (Cornell, '96), Instructor in the Kinematics of Machinery, Sibley College, Cornell University, Ithaca, N.Y. Residence: 163 E. Buffalo Street.

Otto Cornelius Burkhart, B.S., E.M. ('89), C.E. ('92), with the *Engineering and Mining Journal*, 253 Broadway, New York City. Residence: 158 Market St., Bethlehem, Pa.

Charles Noble Butler, C.E., Attorney-at-Law, Patent, Trade-Mark, and Copyright Cases, 1001 Chestnut St., Philadelphia, Pa.

Morton Lewis Byers, C.E., Engineer Maintenance of Way, Chicago Division P. C. C. & St. L. Railroad, Logansport, Ind.

John Jesse Clark, M.E., Chief Instructor in Mathematics and Mechanics, The International Correspondence Schools, and Associate Editor of *Home Study*, P. O. Box 534, Scranton, Pa. Residence: 1210 Mulberry Street.

George Philip Connard, C.E., Engineer in charge of draughting, with Elmira Bridge Co., Lim., Elmira, N.Y. Residence: 303 East Church St.

Reuben Daniels, C.E., Civil Engineer, Pittsburg Plate Glass Co., Ford City, Pa.

George Herschel Davis, C.E., Assistant Engineer, Vermont Marble Co., Proctor, Vt.

William Schaff Davis, C.E., Civil Engineer and Surveyor, of the firm of Davis Bros., 519 Court Street, Reading, Pa. Residence: 49 N. Fourth St.

Philip Hoffecker DeWitt, C.E., Chief Engineer, 11 Pine Street, New York City.

Manuel Victor Domenech, C.E., City Engineer and Architect, Ponce, Porto Rico, West Indies.

George Patterson Dravo, M.E., Purchasing Agent for the Nordberg Mfg. Co., Builders of Corliss Engines, high duty pumping engines, etc., Milwaukee, Wis. Residence: 374 Ninth Ave.

Charles Wesley Focht, C.E., 15 N. Centre Street, Pottsville, Pa.

George Steinman Franklin, M.E., with G. M. Steinman & Co., Hardware, 26 and 28 W. King Street, Lancaster, Pa. Residence: 337 W. Chestnut St.

Samuel Wilson Frescoln, C.E., Civil Engineer and Contractor for Public Works, 7 and 9 Warren St., New York City.

Louis Prevost Gaston, B.S. (in Mining and Metallurgy), C.E. ('89), Somerville, N.J.

William Gates, jr., C.E., Draughtsman, H. C. Frick Coke Co., Scottdale, Pa.

James Bolan Glover, jr., M.E., Superintendent of Motive Power, Marietta & North Georgia Ry., and proprietor of Glover Machine Works, Marietta, Ga.

Hughlett Hardcastle, M.E., M.D. (Univ. Md. '95), First Assistant Resident Physician, University Hospital, Lombard and Green Streets, Baltimore, Md. Permanent address: Easton, Md.

George Augustus Hart, M.E., Bethlehem Iron Co.: 433 Birch Street, South Bethlehem, Pa.

Robert Browne Honeyman, B.S. (in Mining and Metallurgy), of the firm of Shiland & Honeyman, Attor-

neys-at-Law, 80 Broadway, New York City. Residence: Hotel Margaret, Brooklyn.

Sterry Henry Jencks, C.E., Construction Engineer, Pittsburg & Easton R.R., Mahaffey, Pa.

Alfred Eli Lewis, jr., B.S., E.M. ('89), 1510 Chestnut St., Philadelphia, Pa.

Howard Hale McClintic, C.E., Assistant General Manager, Shiffler Bridge Company, 48th Street and A. V. R.R., Pittsburg, Pa. Residence: 108 Fairmount Ave.

Walter Ashfield McFarland, M.E., Superintendent, Water Department of the District of Columbia, District Building, Washington, D.C.

Howard Leoser McIlvain, A.C., William McIlvain & Sons, Manufacturers of Boiler Plate, Reading, Pa.

James Struthers Mack, C.E., Mining Engineer for Hemfield, Greensburg, and Carbon Coal Companies, Greensburg, Pa.

Charles Donnell Marshall, C.E., Secretary Shiffler Bridge Company, 48th Street and A. V. R. R., Pittsburg, Pa. Residence: 226 Fairmount Ave.

Charles Henry Miller, C.E., in charge of Surveys, 3d District, Mississippi River Improvement, U. S. Engineer Office, Box K, Greenville, Miss.

George Philips Miller, B.A. and M.A. (Bucknell), C.E., County Clerk and Recorder, Taos, New Mexico.

John Hoff Millholland, C.E., Attorney-at-Law, 520 Washington Street, Reading, Pa.

Harlan Sherman Miner, A.C., Assistant Chemist for the Welsbach Light Co., Gloucester City, N.J. Residence: 10 N. Broadway.

Harry Semple Morrow, M.E., Latrobe Steel Co., Latrobe, Pa. Home address: 732 Hill Street, (Station D,) Pittsburg, Pa.

Daniel Livermore Mott, C.E., Assistant City Engineer, Utica, N.Y.

William Lynville Neill, B.S. (Lat. Sci.), The New Domain Oil & Gas Co., Prestonsburg, Floyd Co., Ky.

Howard Seger Neiman, A.C., Chemist, 178 Front St., New York City.

*Harry Palmer, C.E.

Charles Jeremiah Parker, C.E., Division Engineer, L. V. R. R., Auburn, N.Y.

Robert Swain Perry, A.C., General Manager, Southern Bauxite Mining and Manuf'g Co., Cave Spring, Ga.

Francis William Birchall Pile, B.S., E.M. ('88), Clerk, Lehigh Construction Co., Engineers and Contractors, L. V. R. R. Building, South Bethlehem, Pa. Residence: 50 Church Street, Bethlehem.

Albert George Rau, B.S. (Sci.), Superintendent Moravian Parochial School, 63 Broad Street, Bethlehem, Pa.

Clarence Elmer Raynor, C.E., Assistant Engineer, New York State Canals, Port Byron, N.Y.

William Pemberton Richards, C.E., Assistant Engineer, District Offices, Washington, D. C. Residence: 306 C Street, N.W.

Osmond Rickert, C.E., Transitman, L. V. Coal Co., Hazleton, Pa. Residence: 41 S. Laurel Street.

William Richard Sattler, M.E., Contracting Engineer, 26 Cortlandt St., New York City. Residence: 609 N. Broad St., Elizabeth, N.J.

Eugene Hicks Shipman, C.E., 721 Cherokee Street, South Bethlehem, Pa.

William Alonzo Stevenson, M.E., Trainmaster, P. and N. Y. Division, Lehigh Valley R. R., Sayre, Pa.

Wyndham Harvey Stokes, B.S., E.M.('89), B.L.(Washington and Lee University), Attorney-at-Law, Welch, McDowell Co., W.Va.

Wilmer Marshall Webb, M.E., Cost Department, Link Belt Machinery Co., 39th Street and Stewart Avenue, Chicago, Ill.

Harvey Musser Wetzel, C.E., Resident Engineer, Santiago Division, Ferro Carril Central Dominicana, Puerta Plata, Republic of Dominica, West Indies. Residence: Guanabano, R.D.

Winter Lincoln Wilson, C.E., Government Engineer on the Guatemala and Mexico Boundary Survey, Guatemala, C.A. Permanent address: Elkton, Md.

*Deceased.

Edward Benjamin Wiseman, C.E., Supervisor, Northern Central Ry., Shamokin, Pa.

Shuntaro Yamaguchi, C.E., (and Imperial University of Tokio '72), Shimo Ni Bancho, Kajimochi Ku, Tokio, Japan.

Luther Reese Zollinger, C.E., Assistant Supervisor P. R.R., Spruce Creek, Pa.

CLASS OF 1889.

James Willoughby Anderson, B.S., E.M. ('90), U. S. Patent Office, Washington, D. C.

Pearce Atkinson, M.E., Evanston, Ill.

Gustav Ayres, M.E., U. S. Patent Office. Address: 1311 New Hampshire Ave., Washington, D. C.

Ralph Putnam Barnard, C.E., LL.M., Accountant, Equitable Coöperative Building Association, 1003 F St., N.W., Washington, D. C. Residence: 1011 O Street, N. W.

Albert Harlan Bates, M.E., LL.B. (Ohio State Univ.), Attorney-at-Law in Patent Cases, 1543 Monadnock Block, Chicago, Ill.

Samuel Erwin Berger, B.A., M.A. ('93), Instructor in Latin and Greek, Central High School, Philadelphia, Pa. Residence: 1027 Mt. Vernon Street.

Charles Hudson Boynton, B.S. (Lat. Sci.), Night Manager, The Associated Press, Corcoran Building, Washington, D.C. Residence: 1357 Princeton Street, N. W.

Joseph Leander Budd, A.C., of the firm of Budd & Kite, Jewelers, 22 N. Thirteenth Street, Philadelphia, Pa.

Rev. Edgar Campbell, B.A., Rector St. Peter's Church, Phœnixville, Pa.

Francis Joseph Carman, A.C., Casper, Wyoming.

Herbert MacKenzie Carson, M.E., Assistant Engineer of Motive Power, Pennsylvania Railroad, Altoona, Pa.

Holden William Chester, C.E., Assistant Engineer, Beech Creek R. R. Co., Jersey Shore, Pa.

Charles William Corbin, B.S. (in Mining and Metallurgy) Superintendent of the Rico Sampling and Smelting Co., Rico, Col.

Justice Cox Cornelius, C.E., Chief Draughtsman, The Wharton Railroad Switch Co., Jenkintown, Pa. Residence : Highland Ave., Chestnut Hill, Philadelphia, Pa.

William Albert Cornelius, M.E., Superintendent of 33″ Cogging and Finishing, 23″ and 10″ Structural Mills, Homestead Steel Works of The Carnegie Steel Co., Munhall, Pa. Residence : Wilkins and Whiteman Sts., E. E., Pittsburg, Pa.

Charles Herbert Deans, C.E., Vice-President of Sooysmith & Co., Contracting and Consulting Engineers, Mills Building, New York City. Residence : 804 St. Nicholas Ave.

Charles Estell Dickerson, jr., B.S. (Sci.), Vice-President, Mount Hermon School, in charge of department of Physics and Chemistry, Mount Hermon, Mass.

Emil Diebitsch, C.E., Superintendent of Construction for Kimball & Thompson, Architects, 66 Broadway, New York City. Residence : 297 Henry St., Brooklyn.

John Webster Dougherty, B.S. (in Mining and Metallurgy), Superintendent, Blast Furnace Department, Pennsylvania Steel Co., Steelton, Pa.

Ralph Marshall Dravo, B.S. (in Mining and Metallurgy), of R. M. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg, Pa. Residence : Edgeworth, Sewickley P. O.

Ernest Hipolite Du Vivier, A.C., Mercantile, 22 Warren Street, New York City.

William Dolloway Farwell, B.A., Night City Editor, *The Tribune*, New York City. Residence : Psi Upsilon Club, 64 W. 39th St.

Henry William Frauenthal, A.C., M.D., Physician, 214 East 50th Street, New York City.

Arthur Hugh Frazier, B.A., Vineyardist, Inglenook Vineyard, Rutherford, Napa Co., Cal.

Frederick Louis Grammer, B.S., E.M. ('90), Superintendent of Colebrook Furnaces, Lackawanna Iron and Steel Co., Lebanon, Pa.

George Wentz Harris, B.S. (in Mining and Metallurgy), Mining Engineer, Elkhorn, McDowell Co., W. Va.

Lightner Henderson, C.E., of the firm of Purdy & Henderson, Civil Engineers, 1553 Monadnock Building, Chicago, Ill., and 1402 Havemeyer Building, New York City.

Conrad Egbert Hesse, B.S. (in Mining and Metallurgy), 508 A Street, S. E., Washington, D.C.

Clarence Walter Hudson, C.E., Assistant Engineer, Phœnix Bridge Company, Phœnixville, Pa.

Archibald Johnston, M.E., in charge of Armor Plate Department, Bethlehem Iron Co., 120 Church Street, Bethlehem, Pa.

John Stower Kellogg, jr., A.C., Metallurgist, Illinois Steel Co., South Chicago, Ill. Residence: 246 61st St.

John Martin Sharpless Kerlin, M.E., Elwyn, Pa.

Sylvanus Elmer Lambert, B.A., M.A. ('91), of the firm of Lambert & Bristow, Attorneys and Counselors-at-Law, 707 Tacoma Building, Chicago, Ill.

John Joseph Lincoln, C.E., Chief Engineer and Superintendent Crozer Land Association, Elkhorn, W. Va.

John Lockett, M.E., Engineer in employ of West India Improvement Co. Permanent address: Bog Walk P. O., Jamaica, W.I.

Arthur Long, A.C., of the firm of Jonas Long's Sons, Dry Goods, Wilkes-Barre, Pa.

John Joseph Martin, C.E., of the firm of Martin & Smyth, Civil Engineers and City Surveyors, Room 611, 44-46 Broadway, New York City.

*Charles Henry Miller, A.C.

Charles Williams Moffett, M.E., Mechanical Manager, National Water Tube Boiler Co., New Brunswick, N.J.

Richard Henry Morris, jr., B.S. (in Mining and Metallurgy), Bristol, Pa.

William Ellis Morris, A.C., 19th and E Streets, Portland, Oregon.

John Thomas Morrow, M.E., Superintendent, Electrolytic Copper Refining Plant of the Boston and Montana Consolidated Copper and Silver Mining Co., Great Falls, Mont.

*Deceased.

Albert Daniel Oberly, C.E., Engineer Corps, H. C. Frick Co., Scottdale, Pa.

Joseph Michael O'Malley, A.C., M.D., Physician, 1104 Jackson St., Philadelphia, Pa.

Robert Henry Eddy Porter, M.E., Assistant Superintendent, Liability Department, Fidelity & Casualty Co., 97 Cedar Street, New York City. Residence: East Orange, N.J.

Arnold Karthaus Reese, B.S., E.M. '90, Blast Furnace Superintendent, Penn Iron & Coal Co., Canal Dover, O.

Abraham Lincoln Rogers, M.E., Care of Babcock & Wilcox Co., Milk Street, Boston, Mass. Residence: 24 Chase Street, Lynn, Mass.

Charles William Schwartz, jr., M.E., Secretary and Business Manager, Philadelphia Textile Machinery Co., 2720 Hancock St., Philadelphia, Pa. Residence: 43 Tulpehocken St., Germantown, Pa.

Arthur Moult Smyth, B.S., E.M. ('90), of the firm of Martin and Smyth, Civil Engineers and City Surveyors, Room 611, 44-46 Broadway, New York City.

Alfred Walton Stockett, C.E., Mine Surveyor, Geldenhuis Deep Gold Mining Co., P. O. Box 1906, Johannesburg, South African Republic.

Lester Clark Taylor, C.E., F. C. Central Norte, Coidoba, Argentine Republic, S.A.

Augustus Thompson Throop, C.E., Assistant Engineer, Cataract Construction Co., Niagara Falls, N. Y. Residence: 19 Sugar St.

Charles Prentice Turner, M.E., Edgar Thomson Steel Co., Pittsburg. Residence: 1109 Walnut Street, Wilkinsburg, Pa.

Clarence Walker, B.S., E.M. ('90), Assistant to Engineer of the Consolidated Traction Companies, *Times* Building, Pittsburg, Pa. Residence: 5757 Parker Street.

Fritz August Weihe, M.E., Newark, Del.

Walter Earle Weimer, A.C., Treasurer, Lebanon Boiler, Foundry & Machine Co., Lebanon, Pa. Residence: 724 Cumberland Street.

Harry Rush Woodall, B.S. (in Mining and Metallurgy), Second Assistant, Second City Survey District, 630 Wood St., Philadelphia, Pa.

Edward Austin Wright, C.E., Assistant Examiner, Room 248, U. S. Patent Office, Washington, D.C. Residence: 1116 T Street.

Joseph Bodine Wright, C.E., 465 W. 22d Street, New York City.

CLASS OF 1890.

Thomas C. J. Baily, jr., C.E., Draughtsman, Department of Street Extension, District Commissioner's Office, Washington, D.C. Residence: 403 C Street, S. E.

Frederick Richard Barrett, C.E., Supervisor, Pocahontas Division, N. & W. R. R., Bluefield, W. Va.

Edwin Herbert Beazell, C.E., Bridge Division, Bureau of Engineering, Carnegie Steel Co., Limited, Room 1418 Carnegie Building, Pittsburg, Pa. Residence: 463 Ella Street, Station D.

Adolph Cardenas, C.E., Engineer Corps, Nicaragua Canal, Managua, Nicaragua, C. A.

William Phelps Cleveland, A.C., Chemist for Empire Zinc Company, Joplin, Mo.

Frank Raymond Coates, B.S., E.M. ('91), Roadmaster, New York Division, N. Y., N. H. & H. R. R. R., Stamford, Conn.

Warren Scott Cope, C.E., Mining Engineer for Greenbrier & Louisville Coal and Coke Cos. Address: McDowell, McDowell Co., W.Va.

Charles Ellery Coxe, B.S., E.M. ('91), Assistant to Manager of the Lixiviation Plant, Hacienda de Platas, Zacatecas, Mexico. Permanent address: care of Mr. W. E. C. Coxe, Toledo, O.

James Barlow Cullum, A.C., with Woodland Fire Brick Co., Woodland, Clearfield Co., Pa.

John William DeMoyer, C.E., Assistant Supervisor, Philadelphia & Reading R. R., Reading, Pa. Residence: 326 N. 6th St.

*Clement Heyser Detwiler, C.E.

Charles Edward Fink, C.E., Draughtsman and Computer of Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa. Residence: Camphill, Cumberland Co., Pa.

*Frederick Elmer Fisher, C.E.

Frank Roberts Fisher, C.E., Bureau of Surveys, 1845 N. 22d Street, Philadelphia, Pa.

Howard Augustus Foering, B.S. (Sci.), Instructor in Mathematics, Ulrich's Preparatory School, Bethlehem, Pa.

Ralph Goodman, C.E., Engineer Corps, P. R. R., Thirty-second Street and Powelton Avenue, Philadelphia, Pa.

George Ellsworth Greene, C.E., Assistant Engineer, Erie Canal, 757 Powers Bldg., Rochester, N. Y. Residence: 309 East Avenue.

Harry Walter Harley, M.E., care of H. M. Harley, Gloucester City, N.J.

David Garth Hearne, C.E., Foreman Steel Department, Riverside Iron Works, Wheeling, W. Va.

James S. B. Hollinshead, B.S., E.M. ('91), General Foreman, Smelting and Converting Departments, Boston and Montana Consolidated Copper and Silver Mining Co., Great Falls, Mont.

Frederic Kidder Houston, M.E., Illustrator, *The New York Recorder*, 15 Spruce Street, New York City. Residence: Ridgewood, N.J.

William Vincent Kulp, C.E., Draughtsman in Engineering Department, Milliken Brothers, 39 Cortlandt St., New York City.

Henry Meyers Kurtz, C.E., Mining and Civil Engineer, Clearfield, Pa.

Harry Kinzer Landis, B.S., E.M. ('91), Consulting Mining Engineer and Broker in Mining Properties, 133 E. 46th St., New York City.

* Deceased.

John Elmer Litch, M.E., with Pennsylvania Steel Co., Steelton, Pa.

Thomas Smith Leoser, A.C., Editor and Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: 451 Madison Ave., Elizabeth, N.J.

Charles Herbert Miller, A.C., C. H. Miller Hardware Co., Huntingdon, Pa.

George Nauman, jr., C.E., with the Pennsylvania R. R. Engineer Corps, Delair, N.J.

Robert Engler Neumeyer, C.E., Borough Engineer of Bethlehem, Borough Engineer of South Bethlehem, Water Superintendent for the Bethlehem Water Co. Residence: 16 Goepp St., Bethlehem.

William Cassidy Perkins, C.E., Mathematical Master at DeVeaux School, Niagara Falls, N.Y.

Asa Emory Phillips, C.E., Assistant Engineer, Engineer Department, D.C., Division of Sewers, Washington, D.C. Residence: Takoma Park, D.C.

Charles Platt, A.C., Ph.D. (Ohio University), F.C.S., Consulting Chemist, Professor of Chemistry and Toxicology, Hahnemann Medical College, Philadelphia.

Alexander Potter, C.E., Civil and Sanitary Engineer, Rooms 83–85, 137 Broadway, New York City.

Edward Williams Pratt, M.E., General Inspector, Chicago & Northwestern Ry., Chicago. Residence: 408 N. Oak Park Ave., Oak Park, Ill.

Edwin Jay Prindle, M.E., LL.M., Assistant Examiner, U.S. Patent Office. Address: P.O. Box 73, Washington, D.C.

Wallace Carl Riddick, C. E., Professor of Mathematics and Civil Engineering, North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N.C.

John Stover Riegel, M.E., with Warren Paper Mfg. Co., Riegelsville, Warren Co., N.J.

Joseph Edgar Sanborn, A.C., Chemist, Warwick Iron Co., Pottstown, Pa. Residence: 548 High Street.

Harry Johns Sherman, C.E., member of firm, Henry S. Haines, Civil Engineering, Wate Works, &c., 313 Temple Building, Camden, N.J. Residence: Broad St., Mount Holly, N.J.

William Calvin Shoemaker, C.E., Transportation Dept. C. H. & D. Ry., Lima, Ohio.

Michael Druck Sohon, A.C., M.S. ('95), Ph.D. (Johns Hopkins), Acting Instructor in Chemistry, Lehigh University, South Bethlehem, Pa. Permanent address; 512 I Street, N.W., Washington, D.C.

William Alston Stevenson, M.E., Superintendent, Stearns Mfg. Co., Engine, Boiler, and General Machine Builders, Erie, Pa. Residence: 225 W. 11th St.

Theodore Alfred Straub, C.E., Vice-President and General Manager, Fort Pitt Bridge Works, Pittsburg, Pa. Residence: 5227 Westminster St.

Francis du Pont Thomson, M.E., Edgar Thomson Steel Works, Braddock, Pa.

Charles Cookman Tomkinson, M.E., Chief Draughtsman for Stearns Mfg. Co., 329 W. Fifth St., Erie, Pa.

Claude Allen Porter Turner, C.E., Chief Draughtsman, Pottsville Iron & Steel Co., Pottsville, Pa.

Aaron Howell Van Cleve, C.E., Office Assistant, in charge of draughting-room, Cataract Construction Co., Echota, Niagara Falls, N. Y.

José Ramon Villalon y Sanchez, C.E., Santiago de Cuba, Isle de Cuba.

Samuel Dexter Warriner, B.A. (Amherst), B.S., E.M. ('90), Mechanical Engineer, Lehigh Valley Coal Co., Wilkes-Barre, Pa.

David Thomas Williams, M.E., Draughtsman, Bethlehem Iron Co. Residence: Catasauqua, Pa.

Herbert Wright, M.E., Assistant Examiner, U. S. Patent Office, Washington, D. C.

CLASS OF 1891.

Murray Blachly Augur, E.E., Train Master, Buffalo Division, Lehigh Valley Railroad, Buffalo, N. Y.

James Edwin Boatrite, C.E., *World* Building, New York City.

J. W. Boyd, C.E., South Bethlehem, Pa.

John Emery Bucher, A.C., Ph. D. (Johns Hopkins), Instructor in Organic Chemistry, Tufts College, Mass.

Jacob Burr Buckley, E.E., Carpenter and Builder, Oxford, N.Y.

Emanuel Chao, C.E., Cienfuegos, Cuba.

Edward Haviland Coxe, C.E., Mining Engineer, Sunday Creek Coal Co., Corning, Perry Co., O.

Warder Cresson, M.E., with Lehigh Valley Railroad Co., Delaware Avenue, South Bethlehem, Pa.

John Rose Davis, C.E., Port Jervis, N.Y.

Eric Doolittle, C.E., Instructor in Astronomy, Flower Astronomical Observatory, Philadelphia, Pa.

Alban Eavenson, A.C., Chemist, J. Eavenson & Sons, 313 N. Twentieth St., Philadelphia, Pa. Residence: 2013 Vine Street.

Juan de la Cruz Escobar, M.E., Mechanical Engineer and Contractor, Matanzas, Cuba.

Walton Forstall, E.E., Superintendent, Lockport Gas and Electric Light Company, Transit and LaGrange Sts., Lockport, N.Y.

John Stillwell Griggs, jr., M.E., Consulting Electrical and Mechanical Engineer, 99 Cedar Street, New York City. Residence: 142 W. 16th Street.

George Samuel Hayes, C.E., Engineer for the Expanded Metal Fireproof Construction Co., 256 Broadway, New York City. Residence: 129 W. Thirteenth St.

John Sidney Heilig, M.E., President Lenox Manufacturing Co., manufacturers of sewing machine attachments. Residence: 518 Tilghman St., Allentown, Pa.

William Albert Heindle, C.E., Superintendent of the Metropolitan Underground Conduit Electric Railroad, Washington, D.C.

John Franklin Hersh, C.E., Hardware Merchant, 815 Hamilton Street, Allentown, Pa.

Hermann Victor Hesse, B.S., E.M. ('92), Lehigh Valley Coal Co., Lost Creek, Pa.

Paul Depue Honeyman, E.E., Chief Foreman, in charge Underground and Central Office, The Metropolitan Telephone and Telegraph Co., 18 Cortlandt St., New York City.

John Turner Hoover, B.S. (in Architecture), Philipsburg, Pa.

Hagime Ichikawa, A.C., Imperial Printing Bureau, Tokio, Japan.

Albert Edward Juhler, A.C., Chemist, Standard Oil Co., Olean, N.Y. Residence: 163 Fourth Street.

Henry Kemmerling, C.E., Teaching, 2623 Main Avenue, Scranton, Pa.

Herman Meriwether Knapp, C.E., with The Variety Iron Works Company, Works No. 2, Cleveland, O.

Frederic Curtiss Lauderburn, B.A., Student at the General Theological Seminary, Chelsea Square, New York City.

Charles McKnight Leoser, B.S., E.M. ('92), Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: Hotel Endicott, 81st Street and Columbus Avenue, New York City.

James Anderson McClurg, B.S. (in Metallurgy), Estimating Department of Keystone Bridge Works, 1316 Carnegie Building, Pittsburg, Pa. Residence: Sewickley.

Frank Anderson Merrick, E.E., with General Electric Co., Schenectady, N.Y.

John Zollinger Miller, E.E., Electrician and Foreman of Factory, Best Telephone Mfg. Co., 1213–17 South Howard St., Baltimore, Md. Residence: 207 Falls Road Ave.

Harry Timothy Morris, M.E., Night Superintendent, Steel Rail Department, Bethlehem Iron Co., South Bethlehem, Pa. Residence: P.O. Building, Bethlehem.

Paul Mayo Paine, C.E., Associate Editor *The Post*, Syracuse, N.Y. Residence: 101 White St.

Edwin Adams Quier, A.C., Secretary, Reading Fire Brick Works, Reading, Pa. Residence: 302 S. Fifth Street.

Walter Freeman Rench, C.E., Engineer Corps, Pennsylvania R. R., Wilmington, Del.

Robert Schmitz, C.E., United States Surveyor, U. S. Engineer Office, Lock Box 812, Philadelphia, Pa.

Ellis Anstett Schnabel, B.A., M.A.('93), Assistant Professor of Latin and Greek, Central High School, Broad and Green Sts., Philadelphia, Pa. Residence: 216 DeKalb Square, West Philadelphia, Pa.

Leidy Rudy Shellenberger, C.E., Draughtsman for Phœnix Iron Co., Phœnixville, Pa.

Ira Augustus Shimer, B.A., Student of Medicine, University of Pennsylvania. Residence: 3338 Walnut Street, Philadelphia, Pa.

Horace Theodore Stilson, C.E., 40 Church Street, Winchester, Mass.

R. Paul Stout, M.E., Foreman Armor Plate Department, Bethlehem Iron Company, 123 Church Street, Bethlehem, Pa.

James Edward Talmage, A.C., D.Sc.D., Ph.D., F. R. M. S., F.R.S. (Edin.), F.G.S., President and Deseret Professor of Geology, University of Utah, Salt Lake City, Utah.

William Sidney Topping, B.S. (Lat. Sci.), Ph. G., Druggist, 235 S. Main Street, Elkhart, Ind.

Domingo Anthony Usina, C.E., Assistant Examiner of Patents, Room 32, Patent Office, Washington, D.C. Residence: 409 Fifteenth St., N.W.

Elias Vander Horst, C.E. with W. R. Fleming & Co., 620 Atlantic Avenue, Boston, Mass.

George Edward Wendle, E.E., Lycoming Electric Co., Williamsport, Pa.

Peyton Brown Winfree, C.E., City Engineer, Bradford, Pa.

CLASS OF 1892.

Rev. William North Robins Ashmead, B.A., Missionary, St. John's P. E. Mission, Westfield, Tioga Co., Pa. Permanent address: Minersville, Schuylkill Co., Pa.

*George W. B. Asmussen, C.E.

Robert Ligget Baird, C.E., Engineer Corps, P. R. R., Mifflintown, Pa.

Joseph Barrell, B.S., E.M. ('93), Instructor in Mining and Metallurgy, Lehigh University, South Bethlehem, Pa.

John Young Bassell, jr., B.S., E.M. ('95), 1615 Lucas Place, St. Louis, Mo.

John Newbaker Bastress, C.E., Assistant Engineer, Berlin Iron Bridge, East Berlin, Conn.

John Mayall Beaumont, M.E., 125 South Seventh Street, Scranton, Pa.

William Williams Blunt, E.E., Electrical Engineer, Westinghouse Electric Co., Limited, 32 Victoria Street, London, S. W., England.

William Young Brady, B.S. (in Architecture), Architect for Department of Public Safety, City of Pittsburg, 5510 Centre Avenue, Pittsburg, Pa.

Charles Merritt Case, B.S., E.M. ('93), Treasurer Royal Elevator Co., grain dealers, 55 Chamber of Commerce Building, Minneapolis, Minn.

George Price Case, B.S., E.M. ('93), Grain, Chamber of Commerce, Minneapolis, Minn.

Philip Lothrop Cobb, C.E., 2509 Euclid Avenue, Cleveland, O.

Frederick Albert Coleman, C.E., Hydraulic and Sanitary Engineer, Rome, N.Y.

Samuel Dewey Cushing, M.E., Asst. Supt. Binghamton General Electric Co., 79 State St., Binghamton, N. Y. Residence: 52 Main St.

Herman Haupt Davis, M.E., Machinist under instruction at Philadelphia Roll and Machine Works, N. W. Cor. 23d St. and Washington Ave., Philadelphia, Pa. Residence: 255 South 16th St.

Morgan Davis, jr., B.S. (in Mining), Mining Engineer, care of Pancoast Coal Co., Throop, Lackawanna Co., Pa.

William Russell Davis, C.E., with Nathaniel Roberts, M. Am. Soc. C. E., 7 Oak St., Jersey City Heights, N.J. Residence: 674 Avenue C, Bayonne, N.J.

* Deceased.

Heber Denman, B.S. (in Mining), Assistant Engineer, Berwind-White Coal Mining Co., Horatio, Pa.

Edwin Dodge, B.S. (in Metallurgy), of the firm of Case, Dodge & Brackett, Railway, Mill and Mine Supplies, Chamber of Commerce Building, Minneapolis, Minn.

Percival Drayton, M.E., Apollo Iron and Steel Co., Apollo, Armstrong Co., Pa.

*Harry S. Eckert, A.C.

Lester Hallett Ely, A.C., care of Coxe Brothers and Company, 143 Liberty Street, New York City. Residence: 26 E. Third St., Bayonne, N.J.

George Washington Engel, B.S., E.M. ('93), Mining Engineering, Lansford, Pa.

Thanlow Gjertsen, C.E., with Sooysmith & Co., Contracting Engineers, Mills Building, New York City. Permanent Address: Saxton, Pa.

*John Adams Gruver, B.A.

William Lawall Jacoby, M.E., care of Latrobe Steel Company, 1720 Old Colony Building, Chicago, Ill.

Alfred Emerson Jessup, B.S. (in Metallurgy), Manager, New York branch of Herendeen Manufacturing Co., Manufacturers of Steam and Hot Water Boilers, 39 Cortlandt St., New York City. Residence: 101 West Eighty-first St.

Juan Jose Jimenez, C.E., with Clinton & Russel, Architects, 32 Nassau St., New York City.

Herman Eugene Kiefer, A.C., M.S. ('94), Ph. D. ('96), Instructor in Geology, Lehigh University. Residence: 16 West Fourth Street, South Bethlehem, Pa.

Robert Reed Kitchel, M.E., P. O. Box 314, New York City.

Sylvester Welch Labrot, C.E., Assistant Engineer, L. & N. R. R., Chief Engineer's Office, Louisville, Ky.

Henry Lefevre, B.S., E.M. ('93), Asst. Engineer, Playa de Oro Gold Mining Co., Playa de Oro, Ecuador. Care Henry Lefevre, Panama, Republic of Columbia, South America.

* Deceased.

Alfred Emory Lister, M.E., Representative in the Wyoming Coal Region of the Eynon-Evans Mfg. Co., 15th and Clearfield Sts., Philadelphia. Residence: 921 Vine St., Scranton, Pa.

William John Lloyd, E.E., Laboratory of Weston Electrical Inst. Co., Newark, N. J. Residence: 246 6th Ave.

John Taylor Loomis, E.E., Collector, Real Estate Department, P. & R. R. R., Reading Terminal, Philadelphia. Residence: 422 South 42nd Street.

Henry Lewis Manley, B.S., E.M. ('93), Division Engineer, Lehigh Valley Coal Co., Hazleton, Pa. Residence: 141 N. Church Street.

Raymond S. Masson, E.E., Electrical Engineer of District office, Westinghouse Electric & Manufacturing Co., Mills Building, San Francisco, Cal.

Edward James Millar, C.E., Civil and Sanitary Engineer, 19 Masonic Temple, Wheeling, W. Va.

Charles Tyler Mosman, E.E., Power and Mining Department, Gen. El. Co., Schenectady, N.Y. Residence: 406 Union St.

Robert Blum Olney, C.E., Acting Engineer, Sewerage Department, Charleston, S.C. Residence: 139 St. Philip Street.

Henry Orth, jr., B.S., E.M. ('93), Patent Attorney, 1011 L Street, N. W., Washington, D.C.

Ramon Eckhart Ozias, B.S. (in Metallurgy), Blast Furnace Department, Pennsylvania Steel Co., Steelton, Pa.

Frank DeWitt Randolph, M.E., Head Draughtsman, C. Potter, jr., & Co., Manufacturers of Printing-Presses, 444 W. Front Street, Plainfield, N.J.

Robert Swenk Rathbun, C.E., City Engineer, 475 Weightman Building; Manager Lehigh Engineering Co., 5 Paxson Building, Allentown, Pa. Residence: 11 N. Tenth Street.

Samuel Arthur Rhodes, E.E., Engineering Department, Chicago Telephone Co., Chicago, Ill. Residence: 429 N. Pine Avenue, Austin, Ill.

John Ira Riegel, C.E., Assistant Engineer, Easton and Amboy Division, Lehigh Valley R. R. Residence: 439 Cherokee Street, South Bethlehem, Pa.

Anton Schneider, C.E., Draughtsman for the Pioneer Electric Power Company, Ogden, Utah.

John Bonner Semple, A.C., Secretary of Sterling Varnish Co., 325 Water Street, Pittsburg, Pa. Residence: Sewickley.

Cass Knight Shelby, M.E., Motive Power Department, P. R.R., Altoona, Pa. Address: P. O. Box 314.

James Causten Shriver, C.E., Civil Engineer, 4 Water Street, Cumberland, Md.

Philip Henry Waddell Smith, E.E., Assistant General Manager of Standard Underground Cable Co., Westinghouse Building, Pittsburg, Pa. Residence: 6730 McPherson St.

Michael Neligan Usina, E.E., Assistant Engineer of Pleasure Yacht *Aileen*, of New York. Permanent Address: 82 Liberty St., Savannah, Ga.

Lester Warren Walker, E.E., Consulting and Contracting Electrical Engineer, Savannah, Ga. Residence: 148 St. Julian St.

David Heikes Witmer, C.E., Assistant Engineer, American Pipe Manufacturing Co., 1319 Filbert Street, Philadelphia, Pa.

Frederic Wittman, A.C., Lanark, Pa.

Charles Oaks Wood, M.E., with T. B. Wood's Sons, Engineers, Founders, and Machinists, Chambersburg, Pa.

Byron Edgar Woodcock, C.E., with the Lehigh Valley Construction Co., South Bethlehem. Address: 28 Market Street, Bethlehem, Pa.

CLASS OF 1893.

George Haldeman Atkins, C.E., Pottsville, Pa.

Harry Jacobs Atticks, E.E., Lisburn, Pa.

Hugh Cunningham Banks, C.E., General Engineering. Room 344 Equitable Building, Atlanta, Ga.

Noble C. Banks, B.S. (in Metallurgy), Engineer and Metallurgist, Helen Mining Co., Graham, New Mexico.

Herman Renner Blickle, C.E., Secretary and Chief Engineer, Fort Pitt Bridge Works, Pittsburg, Pa.

William Irvin Boyd, C.E., District Engineer's Office, No. 70 I Street, N.E., Washington, D.C.

Frederick Edgar Bray, C.E., Structural Draughtsman, Carnegie Steel Co., Limited, 1420 Carnegie Building, Pittsburg, Pa.

Gilbert Forbes Burnett, B.S. (Sci.), Teaching, 109 W. 134th St., New York City.

George Edwin Chamberlain, A.C., Manufacturing Chemist for the American Glucose Company, Peoria, Ill. Residence: 107 Greenleaf Street.

Warren Fellman Cressman, C.E., Sellersville, Pa.

Walter Joseph Dech, B.A., Instructor in Mathematics and Languages, Ulrich's Preparatory School, Bethlehem, Pa.

Charles Malcolm Douglas, B.A., General Theological Seminary, Chelsea Square, New York City.

Charles Hazard Durfee, E.E., Insurance and Real Estate Broker, Secretary and Treasurer People's Co-operative Bank, 60 Bedford St., Fall River, Mass. Residence: 807 High St.

Bernard Enright, A.C., First Assistant Chemist, Bethlehem Iron Company, South Bethlehem, Pa. Residence: 330 E. Fourth St.

Henry Brown Evans, M.E., Instructor in Mathematics and Astronomy, University of Pennsylvania. Address: Flower Astronomical Observatory, Upper Darby P.O., Delaware Co., Pa.

George Harwood Frost, M.E., B.A.Sc. (McGill University, '96), with Frost & Wood, Manufacturers of Agricultural Machinery, Smith's Falls, Ontario, Canada.

Frederick Pardee Fuller, E.E., Construction Department, Metropolitan Telephone and Telegraph Co., New York City. Residence: 140 W. 57th St.

Robert Foster Gadd, C.E., Engineering and Estimating Department, Levering & Garrigues, 552 W. 23d Street, New York City. Permanent address: Sudlersville, Md.

Charles Willits Gearhart, E.E., Foreman Electrical Department, Atlantic Avenue R. R. Co., 55 Park Place, Brooklyn, N.Y.

Harvey Hartzell Godshall, A.C., of the firm of A. C. Godshall & Co., Millers, Lansdale, Pa.

Samuel Laury Graham, A.C., Assistant Chemist, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.

Lee Stout Harris, C.E., Civil, Mining, and Electrical Engineer, for Pulaski Iron Co., Eckman, W.Va.

Claude Sanford Haynes, C.E., Assistant City Engineer, City Engineer's Office, Elmira, N.Y. Residence: 205 W. Hudson Street.

Richard Willis Heard, E.E., Swissvale, Pa.

Robert Culbertson Hays Heck, M.E., Instructor in Mechanical Engineering, Lehigh University, South Bethlehem, Pa.

Charles Lincoln Keller, M.E., Union Bridge Company, Athens, Pa. Permanent address: 5490 East End Ave., Chicago, Ill.

Schuyler Brush Knox, C.E., with Berlin Iron Bridge Co., East Berlin, Conn.

Frank Sigismund Loeb, A.C., Chemist, Shenandoah Furnace Company, Shenandoah, Va.

Hiram Dryer McCaskey, B.S. (in Mining), Head Master, St. Thomas Hall, Holly Springs, Miss.

Charles Louis McKenzie, C.E., with the Shiffler Bridge Co., Pittsburg, Pa. Residence: 238 Fisk Street.

William Price Marr, E.E., Superintendent, Shamokin & Mt. Carmel Electric Railway Co., Shamokin, Pa.

Archibald Stewart Maurice, C.E., Athens, Pa.

George Holbrooke Maurice, C.E., Athens, Pa.

James Edgar Miller, M.E., Consulting Electrical Engineer for the Siemens & Halske Electric Co. of America, 1215 Monadnock Block, Chicago, Ill. Residence: 3001 Calumet Avenue.

William Frederick Mylander, C.E., 509 North Carrollton Avenue, Baltimore, Md.

Clinton Ledyard Olmsted, C.E., Eagle, N. Y.

Charles Joseph O'Neill, E.E., Assistant Examiner, U. S. Patent Office, Washington, D.C. Residence: 1801 E Street, S. E.

Nathaniel Montgomery Osborne, jr., C.E., Clerk in Freight Dept., Norfolk & Western R. R., Norfolk, Va. Residence: 57 Freemason Street.

Charles William Parkhurst, E.E., Assistant Superintendent Electrical Dept., Cramp's Shipyard, Philadelphia, Pa. Residence: 1427 Hanover Street.

Duncan White Patterson, M.E., Assistant Master Mechanic of the Montour Rolling Mills Department of the Reading Iron Co., Danville, Pa. Residence: 100 W. Market Street.

John Gates Peck, C.E., care of Milliken Brothers, 39 Cortlandt Street, New York City. Residence: 12 East 32d Street, Bayonne, N.J.

Raymond Bernard Fitz Randolph, A.C., Bacteriologist, Brooklyn Health Department, Hoagland Laboratory, Henry and Pacific Streets, Brooklyn, N.Y.

John Graham Reid, C.E., 1317 Girard Avenue, Philadelphia, Pa.

Edwin Clark Reynolds, C.E., Rochelle Park, New Rochelle, N.Y.

Francis Evans Richards, C.E., Box 77, Columbus, Miss.

George William Ritchey, B.S. (Lat. Sci.), 26 Bluff Street, Pittsburg, Pa.

Frederick Brittan Sage, E.E., Hackensack, N. J.

Martin Luther Saulsbury, C.E., Civil Engineer, Ridgely, Md.

Joseph A. Schloss, A.C., Chief Chemist, La Gran Fundicion Nacional Mexicana, Monterey, Mexico.

Armin Schotte, C.E., care of Riter and Conley, Allegheny, Pa. Residence: 237 Fisk St., Pittsburg, Pa.

William Frederick Semper, A.C., Chemist, Haskel & Barker Car Co., 832 Pine Street, Michigan City, Ind.

Alexander Beatty Sharp, B.S. (in Metallurgy), General Manager, W. L. Sharp & Son, manufacturing fireplace goods, Steubenville, Ohio.

Noel W. Smith, C.E., Assistant Supervisor N. C. Ry., York, Pa. Residence: 26 E. Philadelphia Street.

Edward Augustus Soleliac, B.S. (in Metallurgy), Assistant Superintendent Adelaide Silk Mills, Allentown, Pa. Residence: 132 North 4th Street.

George Stern, B.A., Law Student, Harvard University. Permanent address: Frostburg, Md.

William Remick Stinemetz, E.E., 1531 P Street, Washington, D.C.

Thomas Harrison Symington, M.E., Assistant Superintendent, Richmond Locomotive Works, Richmond, Va. Residence: 509 E. Grace Street.

John Taylor, A.C., Chemist for Alpha Portland Cement Co., Whitaker, N.J. Residence: 244 Market Street, Bethlehem, Pa.

Lewis Esler Troutman, E.E., Testing Department, General Electric Co., Schenectady, N.Y. Residence: 563 Liberty St.

Fred Conover Warman, C.E., Assistant Engineer and Head Draughtsman, United States Engineer Office, Washington, D.C. Residence: 939 T Street, N. W.

CLASS OF 1894.

William A. Allgaier, B.S., E.M. ('95), Bloomsburg Brass and Copper Co., Bloomsburg, Pa.

William Conklin Anderson, E.E., Acting Superintendent at Red Bank, N.J., for the Consolidated Gas Company of New Jersey (Main office at Long Branch). Residence: Globe Hotel, Red Bank.

George Washington Scott Baton, B.S. (in Mining), Division Engineer with H. C. Frick Coke Co., Scottdale, Pa.

Irvin Isaac Beinhower, M.E., Draughtsman (Assistant to Asst. Supt.), Lincoln Iron Works, Rutland, Vt. Residence: Brock House.

Thomas Joseph Bray, jr., M.E., Secretary and Mechanical Engineer, McGill & Co., Engineers and Machinists, 27th and Smallman Sts., Pittsburg, Pa.

Lawrence Calvin Brink, C.E., 166 West 126th Street, New York City. Employed by N.Y.C. & H.R. R.R. Co.

Rezeau Blanchard Brown, M.E., Manager, Market St. Works, The Newark Gas Co., Newark, N.J.

Emott Davis Buel, C.E., Transitman, U.S. Army Engineer Corps, Hudson River Improvement, 51 State Street., Albany, N. Y. Residence: 21 S. Hawk Street.

James Lindsey Burley, C.E., Civil Engineer, associated with Nathan F. Barrett, Landscape Architect, 50 Wall St., New York City. Residence: Rochelle Park, New Rochelle, N.Y.

William Colwell Carnell, A.C., Chemist, Union Works, Illinois Steel Co., 3179 Ashland Ave., Chicago, Ill. Residence: 3232 Wabash Avenue.

Thomas Francis Carroll, B.S. (Latin-Sci.), 166 York Street, New Haven, Conn.

Alden Brown Diven, C.E., with the La France Fire Engine Co., Elmira, N. Y. Residence: 957 Lake Street.

Water Jules Douglas, C.E., Engineer with L. V. Coal Co., Hazleton, Pa.

Walter Sewell Dunscomb, C.E., Draughtsman, Building Division, Carnegie Steel Co., Pittsburg, Pa. Residence: Oakmont, Pa.

Thaddeus Percival Elmore, C.E., Assistant Manager, Havana Bridge Works, Montour Falls, N. Y. Permanent Address: 109 West Chemung Place, Elmira, N.Y.

Theodore Gwathmey Empie, E.E., Cable Department, N.Y. and N.J. Telephone Co., 16 Smith St., Brooklyn, N.Y.

Frank Faust, E.E., Draughtsman, with The Jackson & Woodin Mfg. Co., Berwick, Pa.

James DuBose Ferguson, C.E., in charge of Engineer Corps, making right-of-way survey, Belvidere Division, P. R. R., Lock Box 78, Phillipsburg, Pa. Permanent address: Office of Broad Street Station, Penna. R. R., Philadelphia, Pa.

Robert Ferriday, C.E., Assistant on Engineering Corps, C. & P. Division, Pennsylvania Co., Wellsville, O. Address: Box 544.

Richard Daniel Floyd, A.C., Manager Floyd Bros. & Co., Converters of Cotton Goods, 187-189 Market Street, Chicago, Ill. Residence: 5426 Jefferson Avenue.

John Jacob Frank, E.E., General Electric Co., Schenectady, N.Y. Residence: 442 State St.

Luther L. Gadd, E.E., Office of Chief Engineer, Cambria Iron Works, Johnstown, Pa.

Frank Wieseman Glading, M.A. (Phila. Central High School), M.E. ('94), M.S. (Cornell), Consulting Engineer for The Ohio Acetylene Gas Co., Rooms 12, 13, 16, 17, St. Paul Building, Cincinnati, O. Residence: 2810 Park Avenue, Walnut Hills.

Milton Brayton Graff, A.C., Asst. Chemist for Proctor & Gamble Co., Ivorydale, Ohio. Residence: Forest Ave., Avondale, Cincinnati, O.

Elwood Aristides Grissinger, E.E., Electrical Engineer and Salesman, Westinghouse Electric and Manufacturing Co., Syracuse, N.Y.

Bayard Guthrie, M.E., Superintendent of the Crucible Works of A. M. Guthrie & Co., Limited, 21st and Smallman Streets, Pittsburg, Pa. Residence: 5978 Alder Street, E.E.

William McCleery Hall, M.A. (Franklin and Marshall), C.E., Assistant Master, Yeates Institute, Lancaster, Pa. Residence: 30 W. King St.

Fletcher Dickerman Hallock, E.E., Electrical Engineering, No. 308 West 5th Street, Plainfield, N.J.

Arthur Williston Henshaw, E.E., Electrician, General Electric Co., Schenectady, N.Y. Residence: 8 Union Street.

Anton Yost Hesse, C.E., with Levering and Garrigues, Iron and Steel Structures, 552-554 W. 23d Street, New York City. Residence: 157 Henry St., Brooklyn, N.Y.

Foster Haven Hilliard, C.E., Surveyor on U.S. Dredge Alpha, Mississippi River Improvement. Address: 2732 Pine Street, St. Louis, Mo.

William Emley Holcombe, E.E., with the General Electric Co., Schenectady, N. Y.

Matthias Harry Holz, M.E., Graduate Student in Electricity, Univ. of Pa. Residence: No. 1514 Brown Street, Philadelphia, Pa.

Alfred A. Howitz, M.E., Box 628, Newport News, Va.

George Washington Hunsicker, A.C., Teacher of Elementary Science, Allentown High School. Residence: 141 North 8th Street.

George Cass Hutchinson, M.E., General Manager, Cass Realty Corporation, 209 E. 23d Street, New York City. Residence: 115 Madison Avenue.

Arthur Bacon Jones, A.C., Assistant Chemist, P. R. R., Altoona, Pa. Residence: 917 Lexington Ave.

Barry Holme Jones, B.S., E.M. ('95), Instructor in Mechanical Engineering, Lehigh University. Address: Bethlehem, Pa.

William Harrison Kavanaugh, M.E., with F. B. Thrall & Co., Wholesale Grocers. Residence: 1602 West 4th St., Williamsport, Pa.

Richard Warren Knight, C.E., Draughtsman, Pottsville Iron and Steel Co., Pottsville, Pa. Residence: 400 Mahantongo Street.

Claude Averett Langdon, C.E., Draughtsman, Pennsylvania Steel Company, Steelton, Pa. Address: 111 Locust Street, Harrisburg, Pa.

Harry Donaldson Leopold, C.E., Draughtsman, Phœnix Bridge Co., Phœnixville, Pa.

James Edwin Little, M.E., Draughtsman, Bethlehem Iron Co., South Bethlehem. Residence: Hokendauqua, Pa.

Clarence Oliver Luckenbach, M.E., with Hale & Kilburn Mfg. Co., 48-50 N. Sixth St., Philadelphia, Pa. Residence: 1718 N. Fifteenth St. Home address: 7 Broad St., Bethlehem.

Matthew McClung, jr., B.S. (in Metallurgy), Chemist, Carrie Furnace Co., Rankin, Pa.

John Douglas McPherson, E.E., 1623 28th Street, N.W., Washington, D.C.

John VanSickle Martenis, M.E., with Sargent and Co. Address: 180 Wooster St., New Haven, Conn.

Joseph Oscar Mathewson, B.S. (in Metallurgy), Chemist for Ashland Coal & Iron Railway Co., Ashland, Ky.

William Spencer Merrill, B.A., Attorney-at-Law, 511 Stimson Block, Los Angeles, Cal.

Walter Henry Miller, M.E., of the firm of Redding & Miller, Electrotypers and Manufacturers of Printers' Metal Furniture, 66-72 New Jersey Railroad Ave., Newark, N.J.

Charles Asher Moore, E.E., Hammonton, N.J.

Julius Lederer Neufeld, E.E., Instructor in Mathematics, Central High School, Philadelphia, Pa. Residence: 1909 South Broad Street.

Carl William Frederick Neuffer, C.E., Draughtsman for the Pennsylvania Coal Co., Dunmore, Pa. Residence: 528 Lackawanna Avenue, Scranton, Pa.

Charles Atwood Newbaker, E.E., Westinghouse Electric and Manufacturing Co., Pittsburg, Pa. Residence: 417 Ross Ave., Wilkinsburg.

Richard Leslie Ogden, A.C., Lehigh Valley Coal Co., Hazleton, Pa.

Jeremiah Francis O'Hearn, C.E., Shenandoah, Pa.

Godwin Ordway, B.S. (in Metallurgy), Assayer and Mining Engineer, Rossland, British Columbia. Permanent address: 702 17th Street, Washington, D.C.

William Arthur Payne, B.S. (in Architecture), Asst. Engineer, care of Ernest Flagg, Architect, 54 Broad St., New York City. Mailing address: 889 Broadway.

William Vaughan Pettit, B.S. (in Metallurgy), Director of Manufacture of Clay Products of Staten Island Terra Cotta and Lumber Co. Residence: 79 Water Street, Perth Amboy, N.J.

Stephen Collins Potts, A.C., Assistant Chemist, P. R. R., Altoona, Pa. Residence: 933 Sixteenth Street.

Thomas Charles Roderick, E.E., with Citizens' Street Railway Co., 311 Cass Ave., Detroit, Mich.

Frank William Roller, M.E., of the firm of Machado & Roller, Electrical Engineers & Contractors, 203 Broadway, New York City. Residence; 515 Clinton Ave., Brooklyn, N.Y.

Charles Beecher Rutter, B.S. (in Mining), Engineer Corps, Lehigh Coal and Navigation Co., Lansford, Pa.

Herman Schneider, B.S. (in Architecture), Architect, Walsh Building, Cumberland, Md.

Benjamin Ferdinand Schomberg, M.E., apprentice, P.R.R. Machine Shops, Altoona, Pa. Residence: 1209 16th Street.

Edgar Earnest Seyfert, C.E., Draughtsman, Pottsville Iron & Steel Co., Pottsville, Pa.

George Elwood Shepherd, E.E., of the firm of Shepherd & Rust, Electrica Engineers, 12 N. Franklin Street, Wilkes-Barre, Pa.

Charles Elder Shipley, E.E., Shops of Westinghouse Electrical and Manufacturing Co., Pittsburg, Pa. Residence: 6730 McPherson St.

Robert Eugene Smith, M.E., Draughtsman, Bethlehem Iron Co. Residence: 135 Broad St., West Bethlehem, Pa.

Herbert Ridley Stratford, A.C., with the George Stratford Oakum Co., Jersey City, N.J. Residence: 574 Garfield Ave.

Walter Christian Swartz, M.E., No. 523 Turner Street, Allentown, Pa.

Frederick George Sykes, E.E., Engineering Department, General Electric Co., Schenectady, N. Y. Residence: 8 Union St.

Charles Hamilton Thompson, B.S. (in Metallurgy), Asst. to Mining Engineer, Sunday Creek Coal Co., Corning, Perry Co., O.

Philip Henry Trout, jr., E.E., Staunton, Va.

Orson William Trueworthy, M.E., Naval Architect, 1313 M Street, N.W., Washington, D.C.

Clarence Porter Turner, E.E., Wilkes-Barre, Pa.

Charles W. Underwood, E.E., Special Agent Wayleaves Department, New York Telephone Co., 18 Cortlandt St., New York City.

Jacob Daniel Von Maur, C.E., with the Scranton Gas & Water Co., Scranton, Pa. Address: 614 Washington Avenue.

Edward Olmstead Warner, E.E., Engineer with Hartford Street Railway Co., 25 Capitol Avenue, Hartford, Conn.

Ruel Chaffee Warriner, B.S. (in Mining), Hazleton, Pa.

Aubrey Weymouth, C.E., with Purdy & Henderson, Civil Engineers, 1402 Havemeyer Building, New York City. Residence: 210 W. 38th Street.

Thomas William Wilson, C.E., Computer of Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa. Residence: Corner Sixth and Briggs Streets, Harrisburg, Pa.

Weldon Burris Wooden, C.E., Hampstead, Md.

CLASS OF 1895.

Herman Leon Arbenz, C.E., Draughting Department, The Pittsburg Bridge Co., 38th Street and A. V. R. R., Pittsburg, Pa. Residence: 5169 Penn Avenue.

Chester Terrill Ayres, E.E., Engineer with the Chicago Economic Fuel Gas Co., 148 Michigan Ave., Chicago, Ill. Residence: 56 Oakwood Avenue.

Franklin Baker, jr., B.S. (in Mining), with the Penn Smelting and Refining Works, Philadelphia. Residence: 2020 N. 22d Street.

Clarence Kemble Baldwin, M.E., Philadelphia Representative of The Exeter Machine Works of Pittston, 205 Walnut Place, Philadelphia, Pa. Residence: 1900 Wallace Street.

Anthony Francis Bannon, jr., C.E., Assistant City Engineer, Bradford, Pa. Residence: 133 Congress Street.

John Collinson Barber, C.E., Levelman Rocky Mountain Section, U. S. Geological Survey, Thatcher, Col. Permanent address: Conaways, Md.

Robert Josiah Bartholomew, M.E., Bath, Pa.

Rollin Calvert Bastress, C.E., Draughtsman, care of Engineer of Bridges, N. Y., N. H. & H. R. R., New Haven, Conn. Residence: 118 Putnam Street.

Harry Wilber Beach, M.E., with H. L. Beach, Manufacturer of Wood-working Machinery, Montrose, Pa.

George Wallace Beggs, C.E., with the Berlin Iron Bridge Co., East Berlin, Conn. Permanent address: 142 N. 10th Street, Reading, Pa.

John Henry Best, C.E., Mechanicsburg, Pa.

Ernest Mar Blehl, E.E., Private Secretary to Superintendent, Western Union Telegraph Co., 1000 Chestnut Street, Philadelphia, Pa. Residence: 601 Oak Lane, Oak Lane Station.

William Bowie, B.S. (Trinity), C.E. ('95), Annapolis Junction, Md. Employed on U. S. Coast and Geodetic Survey.

Charles Sumner Bricker, M.E., with the Union Works of the Illinois Steel Co., 3179 Ashland Ave., Chicago, Ill. Residence, 3232 Wabash Avenue.

Robert Bruce Brinsmade, B.S. (Washington University, St. Louis), E.M. ('95), 4429 Morgan Street, St. Louis, Mo.

James Emery Brooks, M.E., Contracting Agent for the Berlin Iron Bridge Co., East Berlin, Conn. Residence: 10 Garden Street, Hartford, Conn.

Eugene Clare Brown, E.E., Assistant Examiner, U. S. Patent Office, Washington, D.C. Residence: 7 Quincy Street, N.E.

William Henry Brown, B.S., E.M. ('96), Yatesville, Shenandoah Co., Pa.

Walter Turpin Brown, C.E., Bridge and Construction Department, Pencoyd Iron Works, 154 W. Chelten Ave., Germantown, Pa. Permanent address: Centreville, Md.

James Hodgson Budd, C.E., Draughtsman, and Computer on Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa.

Charles Calvin Burgess, C.E., Flemington, N. J.

John Thomas Callaghan, jr., B.S., E.M. ('96), 30 Gant Place, Washington, D.C.

Francis Lee Castleman, C.E., Switch and Signal Department of the Allentown Rolling Mill Co., 227 North 5th Street, Allentown, Pa.

Robert Edes Chetwood, E.E., Assistant Electrician, American Telegraph and Telephone Co., 151–153 Cedar Street, New York City.

Arthur Stebbins Clift, M.E., General Electric Co., Schenectady, N.Y.

William Wheeler Coleman, B.S. (in Metallurgy), with the Bethlehem Iron Co., South Bethlehem, Pa.

William Joseph Collier, C. E., Draughtsman, B. & C. Department, Pennsylvania Steel Co., Steelton, Pa.

Morris Llewellyn Cooke, M.E., Superintendent Acetylene Gas Co., 1013 14th Street, Washington, D.C. Residence: 1216 Connecticut Avenue.

Herbert Maurice Crawford, C.E., Engineering Corps, with the H. C. Frick Coke Co., Scottdale, Pa.

Henry M. S. Cressman, B.A., Principal of Public Schools, Egg Harbor City, N.J.

Howard Stephen Dech, M.E., Assistant Engineer, A. A. Griffing Iron Works, 66 Centre Street, New York City. Residence: 136 Jackson Ave., Jersey City, N. J.

Henry DeHuff, E.E., with D'Olier Electric Co., Engineers and Contractors, 129 South 11th Street, Philadelphia. Residence: 806 North 16th Street.

Stanley Chipman deWitt, E.E., Inspector on the Underground Conduit Construction Department, Bell Telephone Co., Philadelphia. Residence: 879 Perkiomen Street.

James Chambers Dick, C.E., Engineer for Logan Natural Gas and Fuel Co., Logan, O.

Beekman DuBarry, jr., M.E., Apprentice, Penna. R. R. Shops. P. O. Box 112, Altoona, Pa. Permanent Address: 1904 G Street, N.W., Washington, D.C.

Howard Eckfeldt, B.S., E.M. ('96), Mining Engineer and Surveyor for the Mazapil Copper Co., Limited, Concepcion del Oro, Zacatecas, Mexico.

Alfred William Alexander Eden, C.E., Assistant Engineer, Philmont Water Works, under Stanwix Engineering Co., Rome, N.Y. Permanent address: Brown's Town, Jamaica, W.I.

Edward L. Faison, jr., C.E., with the U. S. Geological Survey. Permanent address: Elliott, N.C.

Guy Hector Farman, B.S. (in Metallurgy), Instructor in Assaying and Commercial Assayer for the State School of Mines, Rapid City, South Dakota.

Edward Calvin Ferriday, B.A., Traveling Salesman, Laflin & Rand Powder Co., of New York City. Residence: 149 N. Market St., Nashville, Tenn.

Walter Ferris, M.E., Mechanical Engineer for Laflin & Rand Powder Co., Mountain View, N.J. Residence: Wayne, N.J.

*George Lane Gabrio, E.E.

Andres Garza Galan, C.E., Surveying, Santa Rosa, Coali, Mexico.

Eduardo Antonio Giberga y Galé, M.E., Chief Engineer, Electrical Department, Spanish-American Light and Power Co., Consolidated, Monte 1, Havana, Cuba. Residence: Virtudes 2 A.

John Jameson Gibson, E.E., Inspector, First District, Long Distance Branch, American Telegraph and Telephone Co., 18 Cortlandt St., New York City. Residence: 151 State St., Brooklyn.

Elmer Grant Godshalk, A.C., Lansdale, Pa.

Wallace Russell Goss, C.E., Inspector and Rodman, U.S. Naval Station, Port Royal, S.C. Address: Box 313.

Frederick Taylor Haines, C.E., Law Student, Elkton, Md.

Thomas Graham Hamilton, E.E., with the Consolidated Traction Co., Pittsburg. Residence: 5912 Margaretta Street.

Robert Rieman Harvey, E.E., Westinghouse Electric and Manufacturing Co., Pittsburg. Residence: 6730 McPherson Street, E.E.

Thomas Lloyd Henry, C.E., 59 First Street, Troy, N.Y.

* Deceased.

Howard Samuel Hess, B.A., teaching in public school, Hellertown, Pa.

Ira Miller Higbee, C.E., with the White Deer Water Supply Co., Watsontown, Pa.

William Jacob Hiss, Jr., E.E., Construction Department, Metropolitan Telephone and Telegraph Co., 18 Cortlandt Street, New York City. Residence: 44 Munn Avenue, East Orange, N.J.

William Hopkins, E.E., 1324 18th St., Washington, D.C.

Drew William Irvine, E.E., Electrician, Roanoke Electric Light and Power Co., Roanoke, Va. Residence: 502 Church Ave., S.W.

Charles Borrows Jacobs, A.C., Head Chemist for the General Electric Co., Schenectady, N.Y. Residence: 8 Union St.

Elmer Augustus Jacoby, B.A., Instructor in Ulrich's Preparatory School, Bethlehem.

William Agassiz James, B.S. (in Mining), with William P. Field, Civil Engineer, Prudential Building, Newark, N.J.

Henry Scudder Jaudon, C.E., Inspector, U. S. Naval Station, Box 333, Port Royal, S.C.

Albert Beardsley Jessup, B.S., E.M. ('96), Lehigh Valley Coal Co., Wilkes-Barre, Pa.

Elisha Barton John, C.E., Assistant Engineer's Office, Philadelphia Division, P. R. R., 32d St. and Powelton Ave., Philadelphia, Pa. Residence: 3307 Hamilton St.

Adolph Somers Kappella, E.E., Park Transportation Co., Philadelphia, Pa. Address: 1940 Judson Place.

Dixon Kautz, B.S. (Lat. Sci.), with V. Snyder & Co., Bankers, Moweaqua, Ill.

Warren Byron Keim, C.E., Structural Draughtsman, with Nathaniel Roberts, Member Am. Soc. C.E., Consulting Engineer, 7 Oak St., Jersey City Heights, N.J.

Henry Edward Kip, B.S. (in Architecture), Architect, East Aurora, Erie County, N.Y.

David Henshey Lackey, E.E., Altoona, Pa.

William Allen Lambert, B.A., Student of Theology, Lutheran Seminary, Mt. Airy, Pa.

Louis Edgar Lannan, E.E., 52 I Street, N.W., Washington, D.C.

Arthur Hughes Lewis, B.S., E.M. ('96), Plains, Pa.

Gerald Lewis, A.C., Assistant Chemist, Bethlehem Iron Co. Residence: Chi Phi House, South Bethlehem, Pa.

Benjamin W. Loeb, A.C., Chemist and Assayer, H. C. Harrison, Mining Engineer, Cerrabro, Nuevo Leon, Mexico. Permanent address: 346 Penn St., Reading, Pa.

Theodore Philip Lovering, E.E., Switch-Board Department, New York and New Jersey Telephone Co. Residence: 335 State Street, Brooklyn, N.Y.

Robert A. McKee, M.E., Graduate Student, Naval Architecture and Marine Engineering (candidate for the degree of M. M. E.), Cornell University, Ithaca, N.Y. Residence: 163 E. State St.

Fayette Avery McKenzie, B.S. (Sci.), teaching, 3701 Powelton Avenue, Philadelphia, Pa.

Stuart Tuttle McKenzie, C.E., Draughtsman, Estimating Department, Shiffler Bridge Co., Pittsburg, Pa. Residence: 216 Fisk Street.

Norman Peach Massey, C.E., with Purdy & Henderson, Civil Engineers, 1402 Havemeyer Building, New York City.

Charles Frazier Maurice, C.E., with Bailey & Co., 51 E. 44th St., New York City.

John Samuel Miller, M.E., Erecting and Testing Engineer, Harrisburg Foundry and Machine Works, Harrisburg, Pa. Residence: 225 N. Second St.

Archibald D. Morris, M.E., Bristol, Pa.

William Spencer Murray, E.E., care of Westinghouse Electric and Manufacturing Co., Pittsburg, Pa.

Robert Neilson, jr., C.E., Assistant Supervisor, P. & E., and N. C. Railroads, Williamsport, Pa. Residence: 937 W. Fourth Street.

James Harry Philips, C.E., Office of Assistant Engineer, Philadelphia Division, P.R.R., Middletown, Pa. Permanent Address: Atglen, Pa.

Joseph Phillips, jr., B.S., E.M. ('96), Assayer in Government Mint, San José, Costa Rica.

John Livingston Poultney, M.E., Assistant Inspector of Ordnance, Works of Robert Poole & Son Co., Baltimore, Md. Address: 263 West Hoffman Street.

Henry Crider Quigley, E.E., Resident Manager for Northern Ohio of The Security Trust Co. of Philadelphia. Office: 1033 Garfield Building, Cleveland, O. Residence: 2132 Euclid Avenue.

William Reinecke, jr., B.S. (in Architecture), Architectural Draughtsman, 954 Fifth Street, Louisville, Ky.

Eugene Jesse Rights, C.E., Inspector for the Illinois Steel Co., Joliet Works. Residence: 1000 Cass St., Joliet, Ill.

Herbert Timothy Rights, C.E., Draughtsman and Computer, Chief Engineer's Office, L.V.R.R., South Bethlehem, Pa. Residence: 19 Cedar Street, Bethlehem.

Samuel Neely Riter, M.E., Field Engineer at construction of Duquesne Blast Furnace. Residence: Homestead, Pa. Permanent address: 56 Water St., Pittsburg, Pa.

Eugene Schwinghammer, E.E., 409 Seventh St., S.W., Washington, D.C.

Harry Kent Seltzer, C.E., Instrument-man, Engineer Corps, K. C., P. & G. Ry., Lake Charles, La. Permanent address: Ephrata, Pa.

John Egbert Shero, A.C., Chemist, Illinois Steel Co., 350 91st Street, South Chicago, Ill.

Robert S. Siegel, B.A., Bethlehem, Pa.

Edwin Harrison Sigison, E.E., 294 Baynes Street, Buffalo, N.Y.

John Blake Slack, E.E., Law Student, Mt. Holly, N.J.

Edwin George Steinmetz, E.E., Forming Department, Electric Storage Battery Company, 19th Street and Allegheny Ave., Philadelphia, Pa. Residence: 1513 North 7th Street,

John Eugene Stocker, B.S. (Sci.), Professor of Sciences, Western Military Academy, Upper Alton, Ill.

Robert Melvin Tarleton, B.S. (in Metallurgy), Assistant to Superintendent, Omaha Plant of the Omaha & Grant Smelting and Refining Co., Omaha, Neb. Address: Omaha Club.

Robert Sayre Taylor, B.S. (Sci.), Student, New York Law School. 28 S. Elliot Place, Brooklyn, N.Y.

Nathaniel Thurlow, A.C.

Charles Frederick Townsend, B.S. (in Architecture), Draughtsman for W. H. Allen, Architect, 82 Church St., New Haven, Conn. Residence: 298 Howard Ave.

Joseph Boyer Townsend, E.E., Construction Department, Consolidated Traction Co., *Times* Building, Pittsburg, Pa. Residence: 238 Virginia Ave.

John Frederick Van Benthem van den Bergh, C.E., South Bethlehem, Pa.

Willard Randolph Van Liew, B.S. (in Metallurgy), Box 114, Bisbee, Arizona.

Charles Henry Vansant, C.E., Draughtsman, Phœnix Bridge Co., Phoenixville, Pa. Residence: 140 Church Street.

William Warr, E.E., Constructing and Designing Engineer with Pepper & Register, General Contractors, Philadelphia, Pa. Residence: 436 N. 34th St.

Fred Irving Wheeler, C.E., Water Works Department, City Engineer's Office, Pawtucket, R.I. Residence: 57 Lyon Street.

Harry Amasa White, E.E., with White & Bro., Smelters and Dealers in Metals, 1505 E. Montgomery Avenue, Philadelphia, Pa. Residence: 1654 Vienna St.

John Crum Whitmoyer, E.E., with the Westinghouse Electric & Manufacturing Co., Pittsburg, Pa. Residence: 709 Pitt Street, Wilkinsburg.

Edward Newton Wigfall, A.C., Assistant Superintendent of Paint Department, Harrison Brothers & Co., White Lead and Paint Manufacturers, Philadelphia, Pa. Residence: 1822 Arch Street.

John Marion Wilson, C.E., Levelman, Construction Corps, P. R. R., Mt. Joy, Pa.

Harold Lawden Wood, A.C., Chemist for J. B. and J. M. Cornell, Iron Works, New York City. Residence: Bellevue Ave., Upper Montclair, N.J.

Carlos Yglesias, B.S., E.M.('96), San José, Costa Rica.

CLASS OF 1896.

William James Adams, jr., E.E., with the Electro-Dynamic Co., 2248 N. 16th Street, Philadelphia, Pa.

William Stewart Ayars, M.E., 82 Dana Street, Wilkes-Barre, Pa.

Hobart Bentley Ayers, M.E., 3 Maple Ave., Westerly, R.I.

Albert Doane Ayres, C.E., 53 East Fourth Street, Williamsport, Pa.

Arthur Davison Badgley, E.E., South Bethlehem, Pa.

Francis Hoskins Baldwin, E.E., 260 Crown Street, New Haven, Conn.

Hasell Wilson Baldwin, M.E., Putnam Ave., Zanesville, O.

L. Warrington Baldwin, C.E., with the Illinois Central R.R., Anna, Ill.

Springfield Baldwin, C.E., Masonry Inspector, Southern Railway Co. Address: Charlotte, N.C.

George Pomeroy Bartholomew, B.S. (in Metallurgy), with the Lehigh Valley Coal Co. (Engineering Department), Hazleton, Pa.

Frederick Bartles, C.E., 955 West Fourth Street, Williamsport, Pa.

Charles C. W. Bauder, E.E., Traffic Department, New York Telephone Co., 18 Cortlandt St., New York City.

Fairfax Bayard, C.E., Assistant Examiner, U. S. Patent Office, Washington, D.C. Residence: 1908 3d Street, N.W.

Herbert Huebener Beck, A.C., Chemist, Miller Soap Works, Lancaster, Pa. Residence: 43 W. Orange St.

Edgar Tweedy Belden, C.E., Springdale, Conn.

Moriz Bernstein, C.E., 1214 N. Second Street, Philadelphia, Pa.

Warren Joshua Bieber, B.A., 25 N. Linden Street, Bethlehem, Pa.

Daniel William Bliem, C.E., with J. E. Greiner, Engineer of Bridges, B. & O. R.R., Mount Royal Station, Baltimore, Md.

Benjamin Franklin Bossert, C.E., Phoenixville, Pa.

Howard Franklin Boyer, B.S. (Sci.), Teaching, Public School, Springtown, Pa.

Edward Elisha Bratton, C.E., Assistant Engineer, Lake Superior Power Company, Sault Ste. Marie, Michigan.

Frank Shepard Bromer, M.E., L.V.R.R. Co., 234 Bushkill Street, Easton, Pa.

Maximilian Joseph Bucher, A.C., Columbia, Pa.

George Amandus Buvinger, M.E., Bicycle Department, Stoddard Manufacturing Co., Dayton, O. Address: 29 Marshall Street.

Aaron Beaumont Carpenter, E.E., Avondale, Pa.

Malcolm Carrington, E.E., Electrical Engineer with the Richmond Railway and Electric Co., Richmond, Va. Address: 1316 Grove Avenue.

Frank Leslie Cooke, E.E., with New York Telephone Co., 18 Cortlandt Street, New York City. Residence: Hackettstown, N.J.

Eckley Samuel Cunningham, M.E., Graduate Student, Lehigh University, South Bethlehem.

Samuel Philip Curtis, M.E., Assistant to the General Superintendent and Engineer of the Newark Gas Co., 26 Front Street, Newark, N.J.

Frederic Allyn Daboll, C.E., with Steward & McDermott, Contractors, New York. Present Address: Box 157, New Bedford, Mass.

John William Dalman, M.E., L.V.R.R. Co., 46 S. Fourth Street, Easton, Pa.

Samuel Moses Dessauer, B.S. (in Architecture), Chief Engineer's Office, L. V. R. R. Co., South Bethlehem, Pa.

William Carter Dickerman, M.E., Milton Car Works, Milton, Pa.

Frank Oliver Dufour, C.E., Office of Division Engineer, L. V. R. R., South Bethlehem, Pa. Residence: 523 Cherokee Street.

Edward Miall Durham, jr., C.E., on the Ouachita River Survey (U. S. Government work). Address: Vicksburg, Miss.

Edward Hiram Dutcher, jr., M.E., Buffalo Forge Co., Buffalo, N.Y. Residence: 663 Elm Street.

Timothy Sharpe Eden, E.E., with the Metallurgical Engineer, Bethlehem Iron Co. Residence: 31 N. Centre Street, Bethlehem.

George Ramsey Enscoe, C.E., 57 Lincoln Avenue, Bennett, Pa.

William Alvin Evans, B.S. (in Metallurgy), Summit Hill, Pa.

Charles Victor Ferriday, M.E., with the St. Anthony Falls Water Power Co., Minneapolis, Minn.

Curtis Bertram Flory, E.E., Engineering Department, Link-Belt Engineering Company, Nicetown, Philadelphia, Pa.

Clarence Richard Fountain, E.E., Instructor in the Bliss School of Electricity, Washington, D.C.

Thomas Joseph Gannon, M.E., 422 Locust St., South Bethlehem, Pa.

James Brown Given, E.E., Carlisle, Pa.

*John Savage Graff, E.E.

William Heald Groverman, M.E., Machinist Apprentice, C. & O Ry., Huntington, W. Va. Residence: 925 Sixth Avenue.

David Hall, E.E., Testing Department, Card Electric Motor and Dynamo Co., 1032 Broadway, Cincinnati, O. Residence: 2122 Grand St., Walnut Hills.

Henry Neff Herr, C.E., Wheatland Mills, Pa.

Howard Drysdale Hess, M.E., 1829 Master Street, Philadelphia, Pa.

Robert Parsons Howell, C.E., U. S. Geological Survey, South McAlester, Indian Ty.

William Steell Jackson, E.E., with the Best Telephone Co., Baltimore, Md. Permanent Address: Duncannon, Pa.

Victor Albert Johnson, B.S. (in Metallurgy), St. Paul, Minn.

* Deceased.

Victor Witmer Kline, C.E., with A. H. Crapsey & Son, Box 1151, Lockport, N.Y.

Robert Edwin Kresge, A.C., Assistant Chemist, Bethlehem Iron Co., South Bethlehem, Pa.

Robert Edward Laramy, B.A., teaching, Moravian Parochial School, Bethlehem, Pa. Residence: 81 Broad Street.

Bruce Emerson Loomis, E.E., Electrician for the B. F. Sturtevant Co., 131 Liberty St., New York City.

Wheeler Lord, M.E., Assistant Superintendent, Pennsylvania Bolt and Nut Co., Lebanon, Pa.

John Buckley MacBride, C.E., Inspector and Assistant to Chief Engineer, Deckertown Water Works, Deckertown, N.J.

Clifford Sherron MacCalla, E.E., with the Bell Telephone Co. of Philadelphia. Address: 237 Dock Street.

Victor Emanuel Masson, A.C., with the Pleasant Valley Wine Co., Rheims, N.Y.

Edward Williamson Miller, B.S. (in Metallurgy), Graduate Student, Lehigh University. Address: 135 North St., Bethlehem, Pa.

Rafael de la Mora, M.E., at the L. V. R. R. Shops, South Easton. Residence: 234 Bushkill St., Easton, Pa.

Charles Howard Morgan, E.E., Maxatawny, Pa.

William Hitz Mussey, E.E., Draughting-Room, Baldwin Locomotive Works, Philadelphia, Pa.

John Henry Myers, C.E., Lewistown, Pa.

Franklin Oberly, E.E., Easton, Pa.

Walter Raleigh Okeson, C.E., Bethlehem, Pa.

Louis Atwell Olney, A.C., Providence, R.I.

Horace Lucius Palmer, C.E., Assistant Supervisor of Norfolk Division, Norfolk & Western Railway Co., Crewe, Va.

Jacob Grafius Petrikin, B.S. (in Architecture), Lock Haven, Pa.

Morris Wright Pool, M.E., 936 S St., N. W., Washington, D.C.

James Lee Rankin, jr., M.E., Draughtsman, care of Julian Kennedy, Vandergrift Building, Pittsburg, Pa. Residence: 225 Emerson Street.

Henry Paul Reed, E.E., with the Edison Electric Illuminating Co., New York City. Address: Fort Schuyler, N. Y.

Homer Austin Reid, C.E., Assistant Supervisor Lynchburg Division, Norfolk & Western Railway Co., Lynchburg, Va. Permanent address: 111 N. Chestnut Street, Warren, O.

George Homer Ruggles, C.E., Engineer Corps, Illinois Central R. R., Belleville, Ill. Permanent Address: Cherokee, Ia.

Clement Clarence Rutter, C.E., Lansford, Pa.

John Cornelius Sesser, C.E., St. Joseph, Mich.

*Arthur Yeager Shepherd, M.E.

Luther D. Showalter, C.E., Pottstown, Pa.

Henry Shriver, jr., M.E., Draughtsman for George's Creek & Cumberland R. R., Cumberland, Md. Address: 77 Washington St.

Edward Stewart Taylor, M.E., Fort Wayne Electric Corporation, Fort Wayne, Ind.

William Bailey Taylor, E.E., 81 Market St., Bethlehem, Pa.

John Augustus Thomson, B.S. (in Metallurgy), Graduate Student, Lehigh University, South Bethlehem, Pa.

Edward Coppée Thurston, B.S. (in Metallurgy), 4 Schrende Strasse, Freiberg, Saxony, Germany.

Joseph Wharton Thurston, B.A., 311 Cherokee Street, South Bethlehem, Pa.

Curtis Edwards Trafton, E.E., 90 Franklin Street, Fall River, Mass.

Harry Conklin Tripp, M.E., Draughtsman, American Stoker Co., Dayton, O.

John Scofield Wallace, B.S. (in Metallurgy), New Castle, Pa.

Ulysses Grant S. Walters, C.E., Pottstown, Pa.

Harry Dallam Webster, M.E., of the firm of Harry D. Webster & Co., General Agents for Maryland and the District of Columbia of the Racine Fire Engine Co. Address: 210 N. Calvert Street, Baltimore, Md.

* Deceased.

Frank Thomas Weiler, C.E., Pequea, Pa.

Davis Sanno Williams, B.S. (in Architecture), Fort Snelling, Minn.

David William Wilson, jr., B.S. (in Architecture), Student, Columbia University School of Architecture, New York City. Residence: 381 Greene Ave., Brooklyn.

Job Roberts Wilson, E.E., Engineer's Office, N. Y. Telephone Co., 18 Cortlandt Street, New York City.

Alfred Mahlon Worstall, E.E., General Manager for G. S. W. Brubaker, Contracting Engineer, 39 E. Grant St., Lancaster, Pa.

The number of graduates is 883, degrees having been conferred as follows:

Upon graduates of the School of General Literature: B.A., 47; B.S., 22; Ph.B., 7; M.A., 9.

Upon graduates of the School of Technology: C.E., 323; M.E., 174; B.M., 19; B.S. (in Mining and Metallurgy), 82; E.M., 71; E.E., 98; A.C., 90; B.S. (in Architecture), 11; M.S., 2; Ph. D., 2.

Of these, 9 have taken the degrees of B.A. and M.A.; 2 of B.S. and C.E.; 1 of B.S. and A.C.; 11 of B.M. and E.M.; 38 of B.S. and E.M.; 1 of B.M., E.M., and A.C.; 1 of B.S., E.M., and C.E.; 1 of C.E. and E.M.; 2 of A.C. and E.M.; 1 of A.C. and M.S.; 2 of A.C., M.S., and Ph. D. 844 graduates are still living.

ONE-YEAR COURSE IN ELECTRICITY.

Beginning with the year 1884-85, the University offered a special course in Electricity, covering one year's work. Those who completed this course received certificates but no degrees. In 1888, the full four-year course in Physics and Electrical Engineering, leading to the degree of E.E., was established, and the one-year course was withdrawn. The names of those who completed this course are not included in the Roll of Alumni, but are here given:

Elmer Ellsworth Boyer, '85, General Electric Co., Lynn, Mass.

Albert Brodhead, '88, 121 S. Centre Street, Bethlehem, Pa.

Edward Conner, '86, Philadelphia, Pa.

William Fairchild Dean, '88, Thomson-Houston Electric Co., 91 Warren Street, Lynn, Mass.

Horace Musser Engle, '85, Technician, Roanoke, Va.

Herman Frauenthal, '88, M.D., 214 E. 50th St., New York City.

Walter George Fuller, '87, Brattleboro, Vermont.

John Wesley Hackney, '87, Graphic Process Co., Pleasantville, N. J.

James Arthur Heaton, '86, Boston, Mass.

Richard Otto Albert Heinrich, '88.

William Hoopes, '86, Superintendent Edison Electric Co.'s Station, West Chester, Pa.

Joseph Allison Horner, '88.

William Henry Hubbard, '88, General Agent, Helios Electric Co., 1229 Callowhill St., Philadelphia, Pa.

Walter Eugene Hyer, '86.

Daniel Henry Jenkins, '88, Mutual Electric and Accumulator Co., 76 Ashland Place, Brooklyn, N. Y.

Charles Leavitt Jenness, '85, Western Electric Co., Chicago, Ill.

William Sigler Jones, '87, Secretary, The Quaker City Electric Co., 236–238 Carter St., Philadelphia, Pa. Residence: 5144 Wayne Avenue, Germantown.

George Herman Koehler, '85, Standard Underground Cable Co., Pittsburg, Pa.

Robert McAllister Lloyd, '86, Electrical Engineer, 27 Pine St., New York City.

Dion M. Martinez, jr., '87, Reading R. R. Co., Philipsburg, Centre Co., Pa.

Charles Jacob Meade, '86, Edison Electric Illuminating Co. of New York, 348 W. 20th Street, New York City.

Charles Jacob Miller, '88.

James Leidy Moore, '88, Thomson-Houston Electric Co., Lynn, Mass.

George Harrison Neilson, '86, Supervisor, Altoona Division, Pennsylvania R. R., Altoona, Pa.

Horace Fields Parshall, '87, Edison General Electric Co., Schenectady, N. Y.

George Herbert Putnam, '85, Instructor in Physics and History, Texas School for the Deaf, Austin, Tex.

Charles Norris Robinson, '88, Insurance Agent, 420 Walnut St., Philadelphia, Pa.

Harry Meyer Seitzinger, '88, Manager of Machine and Electrical Department, J. G. Seitzinger Screen and Machine Works, 6 Northampton St., Wilkes-Barre, Pa.

Arthur Douglas Spear, '87, Brush Electric Co., Cleveland, O.

Lewis Buckley Stillwell, '85, Assistant Electrician, Westinghouse Electric Co., Pittsburg, Pa.

Charles Wesley White, '88, Excelsior Electric Co., Brooklyn, N. Y.

George Henry Wolle, '87, Electrical Accumulator Co., 44 Broadway, New York City.

Hugh Carlyle Young, '88, Superintendent Wellsboro' Electric Company, Wellsboro', Tioga County, Pa.

OFFICERS OF THE ALUMNI ASSOCIATION OF THE LEHIGH UNIVERSITY, 1896-97.

President:

LOUIS O. EMMERICH, Hazleton, Pa.

Vice-Presidents:

CHARLES E. RONALDSON, New York City.
ARTHUR E. MEAKER, South Bethlehem, Pa.

Secretary and Treasurer:

HARRY H. STOEK, State College, Pa.

Honorary Alumni Trustees:

WASHINGTON H. BAKER, M.D., Philadelphia, Pa.
(Term expires June, 1897.)

THOMAS M. EYNON, Philadelphia, Pa.
(Term expires June, 1898.)

H. R. PRICE, M.D., Brooklyn, N.Y.
(Term expires June, 1899.)

W. ARTHUR LATHROP, Wilkes-Barre, Pa.
(Term expires June, 1900.)

Executive Committee:

L. O. EMMERICH, *Chairman*,

WASHINGTON H. BAKER. W. A. LATHROP,
THOMAS M. EYNON, C. E. RONALDSON,
H. R. PRICE, A. E. MEAKER,
HARRY H. STOEK.

CONTENTS.

Almanac.

Calendar, 3.

Board of Trustees, 4.

Honorary Trustees, 4.
Honorary Alumni Trustees, 5.
Officers of the Board, 5.
Executive Committee, 5.
Library Committee, 6.
Building Committee, 6.
Comm. on College Administration, 6.

Faculty, 7.

President and Professors, 7.
Lecturers, 8.
Instructors and Assistants, 8.
Gymnasium Service, 11.
Library Service, 11.

Origin and Design of the University, 12.

Tuition, 12.

Public Worship, 13.

Site, 14.

Buildings, 14.

Packer Hall, 14.
The Chemical Laboratory, 14.
The Metallurgical Laboratory, 15.
The Physical Laboratory, 15.
The Sayre Observatory, 17.
The Packer Memorial Church, 17.
The University Library, 17.
The Gymnasium, 17.

Expenses of Students, 18.

Admission of Students, 19.

Date of Examinations, 19.
Character of Examinations, 20.
Requirements for Admission, 20.
Conditional Admission, 26.
Special Students, 26.
Admission to Advanced Studies, 26.
Admission to Graduate Courses, 26.
Preparatory School Certificates, 27.

Program of Studies, 28.

THE SCHOOL OF GENERAL LITERATURE, 28.

The Classical Course, 38.
The Latin-Scientific Course, 43.
The Course in Science and Letters, 46.

THE SCHOOL OF TECHNOLOGY, 50.

The Course in Civil Engineering, 50.
The Course in Mechanical Engineering, 55.
The Courses in Mining Engineering, 61.
Shorter Course in Mining, 71.
The Course in Elect. Eng., 75.
The Course in Chemistry, 80.
The Course in Architecture, 89.

Physical Culture, 92.

Graduating Theses, 93.

Diplomas and Certificates, 93.

Graduate Students, 93.

Graduate Degrees:

Requirements for M.A., 93.
Requirements for M.S., 94.

The University Library, 94.

The Observatory, 96.

The University Museum, 96.

Summer School of Surveying, 97.

Students' Societies, 98.

Founder's Day, 101.

The University Sermon, 101.

Theses presented by candidates for degrees in 1896, 101.

University Day, 108.

Exercises of June 17, 1896, 108.
Award of Wilbur Scholarship, 109.
Award of the Wilbur Prizes, 109.
Degrees Conferred, 110.

The Wilbur Scholarship, 113.

The Alumni Scholarship, 113.

The Henry S. Haines Memorial Scholarship, 113.

The Mercur Memorial Fund Scholarships, 114.

The Wilbur Prizes, 114.

The Alumni Prizes in Oratory, 114.

Examination Papers, 115.

Catalogue of Students, 131.

Graduate Students, 131.
Senior Class, 132.
Junior Class, 134.
Sophomore Class, 136.
Freshman Class, 138.
Special Students, 141.

Summaries of Students:

By States, 142.
By Classes and Courses, 144.

List of Alumni, 145.

Officers of Alumni Association, 207.

LIBRARY
OF THE
UNIVERSITY of ILLINOIS.

REGISTER

OF

THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PA

1897-1898.

FOUNDED BY ASA PACKER.

LANCASTER, PA.
THE NEW ERA PRINTING COMPANY.
1898.

TABULAR ALMANAC.

1897.

JULY.

S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

AUGUST.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

SEPTEMBER.

S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

OCTOBER.

S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

NOVEMBER.

S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	..	..	..	..
..	..	..	..	..	..	..

DECEMBER.

S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

1898.

JANUARY.

S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

FEBRUARY.

S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	..	..	..	..	..
..	..	..	..	..	..	..

MARCH.

S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	..	..
..	..	..	..	..	..	..

APRIL.

S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
..	..	..	..	..	..	..

MAY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

JUNE.

S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

JULY.

S	M	T	W	T	F	S
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

AUGUST.

S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

SEPTEMBER.

S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

OCTOBER.

S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

NOVEMBER.

S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	..	..	..
..	..	..	..	..	..	..

DECEMBER.

S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

1899.

JANUARY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

FEBRUARY:

S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	..	..	..	..
..	..	..	..	..	..	..

MARCH.

S	M	T	W	T	F	S
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

APRIL.

S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	..	..	..	..	..	..

MAY.

S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

JUNE.

S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

CALENDAR

1897.	**1897-1898.**
Sept. 18, 20, 21,	Examinations for Admission.
Sept. 22,	First Term begins.
Oct. 14,	Founder's Day.
Nov. 25,	Thanksgiving Day.
Dec. 22, 12½ P. M.,	Christmas Holidays begin.
1898.	
Jan. 3, 8¼ A.M.,	Christmas Holidays end.
Jan. 15,	Junior Prize Orations due.
Feb. 2,	First Term ends.
Feb. 3, 8¼ A. M.,	Second Term begins.
Feb. 22,	Washington's Birthday.
April 6, 12½ P. M.,	Easter Holidays begin.
April 13, 8¼ A. M.,	Easter Holidays end.
May 21,	University Day Orations due.
May 25,	Senior Examinations begin.
June 6,	Annual Examinations begin.
June 8,	Graduation Theses due.
June 12,	Baccalaureate Sunday.
June 13,	Class Day.
June 14,	Alumni Day.
June 15,	University Day.
June 16–July 9,	Summer School of Surveying.
June 16, 17, 18,	Examinations for Admission.
1898.	**1898-1899.**
Sept. 17, 19, 20,	Examinations for Admission.
Sept. 21,	First Term begins.
Oct. 13,	Founder's Day.
Dec. 22, 12½ P. M.,	Christmas Holidays begin.
1899.	
Jan. 3, 8¼ A.M.,	Christmas Holidays end.
Feb. 2,	Second Term begins.
June 14,	University Day.

BOARD OF TRUSTEES.

Robert H. Sayre,	South Bethlehem.
William H. Sayre,	South Bethlehem.
Elisha P. Wilbur,	South Bethlehem.
James I. Blakslee,	Mauch Chunk.
Charles Hartshorne,	Philadelphia.
Henry S. Drinker,	Philadelphia.
Robert P. Linderman,	South Bethlehem.
Henry R. Price, M.D.,	Brooklyn, N. Y.

(Two vacancies.)

HONORARY TRUSTEES.

The Rt. Rev. Leighton Coleman, S.T.D.,	Wilmington, Del.
Charles Brodhead,	Bethlehem.
W. L. Conyngham,	Wilkes-Barre.
Charles O. Skeer,	Mauch Chunk.
The Rev. Marcus A. Tolman,	Mauch Chunk.
The Hon. Henry Green,	Easton.

HONORARY ALUMNI TRUSTEES.

	TERM EXPIRES	
THOMAS M. EYNON, Class of 1881,	1898,	Philadelphia.
GARRETT B. LINDERMAN, Class of 1887,	1899,	South Bethlehem.
W. ARTHUR LATHROP, Class of 1875,	1900,	Wilkes-Barre.
FRANK P. HOWE, Class of 1878,	1901,	Philadelphia.

OFFICERS OF THE BOARD.

President,
ROBERT H. SAYRE.

Secretary,
ELISHA P. WILBUR.

Treasurer of the University,
ELISHA P. WILBUR.

Assistant Treasurer,
WILLIAM HENRY GUMMERE.

EXECUTIVE COMMITTEE.

ROBERT H. SAYRE, *Chairman,*
ELISHA P. WILBUR, HENRY S. DRINKER,
JAMES I. BLAKSLEE, WILLIAM H. SAYRE.
R. MORRIS GUMMERE, *Secretary.*

COMMITTEE ON BUILDINGS AND GROUNDS.

ELISHA P. WILBUR, *Chairman*,

ROBERT H. SAYRE, WILLIAM H. SAYRE.

COMMITTEE ON COLLEGE ADMINISTRATION.

HENRY S. DRINKER, *Chairman*,

WILLIAM H. SAYRE, ROBERT P. LINDERMAN.

President of the University.
University Park, South Bethlehem.

WILLIAM H. CHANDLER, Ph.D., F.C.S.,
Professor of Chemistry.
251 Cherokee Street, South Bethlehem.

BENJAMIN W. FRAZIER, A.M., Sc.D.,
Professor of Mineralogy and Metallurgy.
University Park, South Bethlehem.

H. WILSON HARDING, A.M.,
Emeritus Professor of Physics.

MANSFIELD MERRIMAN, C.E., Ph.D.,
Professor of Civil Engineering.
University Park, South Bethlehem.

SEVERIN RINGER, U.J.D.,
Professor of Modern Languages and Literatures, and of History.
424 New Street, South Bethlehem.

EDWARD H. WILLIAMS, Jr., B.A., E.M., A.C., F.G.S.A.,
Professor of Mining Engineering and Geology.
117 Church Street, Bethlehem.

JOSEPH F. KLEIN, D.E.,
Professor of Mechanical Engineering.
357 Market Street, Bethlehem.

WILLIAM ANDREW ROBINSON, M.A.,
Professor of the Greek Language and Literature,
and Secretary of the Faculty.
St. Luke's Place, South Bethlehem.

EDMUND MORRIS HYDE, M.A., Ph.D., L.H.D.,
Professor of the Latin Language and Literature.
Third and Seneca Streets, South Bethlehem.

CHARLES L. THORNBURG, C.E., PH.D.,
Professor of Mathematics and Astronomy.
308 Packer Avenue, South Bethlehem.

WILLIAM C. THAYER, M.A.,
Professor of the English Language and Literature.
59 Market Street, Bethlehem.

WILLIAM S. FRANKLIN, M.S.,
Professor of Physics and Electrical Engineering.
518 Seneca Street, South Bethlehem.

LANGDON C. STEWARDSON, M.A.,
Professor-elect of Mental and Moral Philosophy.

ASSISTANT PROFESSORS AND LECTURERS.

ARTHUR E. MEAKER, C.E.,
Assistant Professor of Mathematics.
542 North Street, Bethlehem.

PRESTON A. LAMBERT, M.A.,
Assistant Professor of Mathematics.
215 South Centre Street, Bethlehem.

JOSEPH W. RICHARDS, M.A., A.C., M.S., PH.D.,
Assistant Professor of Metallurgy, Mineralogy, and Blowpiping.
Absent on leave.

WILLIAM L. ESTES, M.D.,
Lecturer on Physiology and Hygiene.
St. Luke's Hospital, South Bethlehem.

ALEXANDER MACFARLANE, M.A., D.SC., LL.D.,
Lecturer on Mathematical Physics.
Chatham, Ont.

JOHN L. STEWART, A.B., PH.B.,
Lecturer on History and Economics.
1401 North 17th Street, Philadelphia.

INSTRUCTORS AND ASSISTANTS.

LEWIS BUCKLEY SEMPLE, M.A., PH.D.,
Instructor in English.
17 North Street, Bethlehem.

RALPH M. WILCOX, PH.B.,
Instructor in Civil Engineering.
41 Second Avenue, West Bethlehem.

FREDERICK W. SPANUTIUS, M.S.,
Instructor in Qualitative Analysis, Assaying, and Industrial Chemistry.
106 North High Street, Bethlehem.

WILLIAM B. SCHOBER, PH.D.,
Instructor in Organic Chemistry and Chemical Philosophy.
464 New Street, South Bethlehem.

HERMAN EUGENE KIEFER, A.C., M.S., PH.D.,
Instructor in Geology and Lithology.
438 Cherokee Street, South Bethlehem.

ROBERT C. H. HECK, M.E.,
Instructor in Mechanical Engineering.
422 Cherokee Street, South Bethlehem.

J. GRANT CRAMER, A.M., PH.D.,
Instructor in Modern Languages.
468 Chestnut Street, South Bethlehem.

HARRY M. ULLMANN, A.B., PH.D.,
Instructor in Quantitative Analysis.
148 South Main Street, Bethlehem.

J. HENRY KLINCK, M.E.,
Instructor in Electrical Engineering.
440 Cherokee Street, South Bethlehem.

HENRY STORRS WEBB, B.S.,
Instructor in Electrical Engineering.
411 Cherokee Street, South Bethlehem.

JOHN HUTCHESON OGBURN, C.E.,
Instructor in Mathematics and Astronomy.
462 Chestnut Street, South Bethlehem.

BARRY HOLME JONES, B.S., E.M.,
Instructor in Mechanical Engineering.
Sun Inn, Bethlehem.

LEOPOLD OLIVIER DANSE, M.E.,
Instructor in Mechanical Engineering.
250 Wall Street, Bethlehem.

SCHUYLER S. CLARK, S.B.,
Instructor in Physics.
American House, Bethlehem.

ROBERT B. WILLIAMSON, M.E.,
Instructor in Electrical Engineering.
505 West Fourth Street, South Bethlehem.

NATT M. EMERY, B.A.,
Instructor in English.
American House, Bethlehem.

CHARLES REED MILLER, PH.D.,
Instructor in Modern Languages.
452 Chestnut Street, South Bethlehem.

WARREN BYRON KEIM, C.E.,
Instructor in Civil Engineering.
468 Chestnut Street, South Bethlehem.

WINTER LINCOLN WILSON, C.E.,
Instructor in Civil Engineering.
South Bethlehem.

JOHN BOYT, B.S.,
Assistant in Metallurgy.
431 Cherokee Street, South Bethlehem.

THOMAS CEDWYN THOMAS, B.S.,
Assistant in Mining.
338 Vine Street, South Bethlehem

FRANK OLIVER DUFOUR, C.E.,
Assistant in Civil Engineering.
523 Cherokee Street, South Bethlehem.

THE PACKER MEMORIAL CHURCH.

Chaplain-Elect,
THE REV. LANGDON C. STEWARDSON, M.A.

Organist,
J. FRED. WOLLE,
148 Church Street, Bethlehem.

GYMNASIUM.

Instructor,
C. W. SMITH.

LIBRARY.

Director,
WILLIAM H. CHANDLER, PH.D.

Cataloguer,
A. W. STERNER.

Shelf Clerk,
PESER F. STAUFFER,

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer, of Mauch Chunk, during the year 1865, appropriated the sum of $500,000, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. On this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete education, technical, literary, and scientific, for those professions represented in the development of the peculiar resources of the surrounding region. In furtherance of this purpose instruction is liberally provided in Civil, Mechanical, Mining, and Electrical Engineering, Metallurgy, Chemistry, and in all needful collateral studies. A School of General Literature is also established and thoroughly equipped, and includes the Classical course, the Latin-Scientific course, and the course in Science and Letters.

TUITION.

The following charges are made for tuition:

For students in the Technical courses, $100 per annum: $60 for the first term, $40 for the second term; for students in the school of General Literature, $60 per annum: $40 for the first term, $20 for the second term.

These fees include all tuition, with the use of the Library and Gymnasium, but the student is charged for materials and apparatus consumed in the Laboratories.

The Trustees have placed at the disposal of the Faculty a limited number of scholarships, to be awarded to applicants of good moral character who shall pass the entrance examinations creditably, and who for other cause shall be regarded as worthy by the Faculty.

Through the kindness of friends of the University, provision has been made for the awarding of a limited number of free scholarships to students taking the Classical Course who in other respects fulfil the above conditions.

Application for these free scholarships should be made to the President of the University, who will furnish all needed information concerning the regulations which govern their bestowal.

All fees for tuition are payable to the Treasurer of the University in two instalments, as above. The first instalment is to be paid to the Treasurer of the University on or before October 10th; the second on or before February 10th.

Students who fail to pay tuition fees when due will be notified by the President that their attendance at college exercises must be discontinued until payment is made.

Every candidate for a degree is required to pay a gradution fee of $10, before the degree is conferred.

PUBLIC WORSHIP.

Prayers are held in the Packer Memorial Church of the University every morning, the attendance being voluntary.

Divine service is held every Sunday morning in the church. Any student who may desire to attend some other place of worship will be permitted to do so upon the request of his parent or guardian or, if he be 21 years of age, upon his own request. The request for such permission should be renewed at the beginning of each term. Attendance, either at the Packer Memorial Church or at the church of his selection, is required of every student.

SITE.

The situation of the institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

South Bethlehem is situated at the junction of the Lehigh Valley, the New Jersey Central, and the Reading (North Pennsylvania) Railroads, and the University buildings are about a half-mile from the station. New York is eighty-seven and Philadelphia fifty-eight miles distant.

BUILDINGS.

PACKER HALL.

This building, completed in 1869, is four stories in height, 215 feet long, and mostly 60 feet in width. It is built of Potsdam sandstone in the English Gothic style of architecture, and occupies a commanding position, overlooking Bethlehem, West Bethlehem, and South Bethlehem. It contains the lecture and recitation rooms of the departments of Greek, Latin, Modern Languages, History, and Mathematics.

The department of Civil Engineering has, on the first floor, two drawing rooms and three lecture rooms, together with instrument rooms and offices. Here are found collections of bridge models, photographs and blue prints, specimens of building materials, and also a large number of levels, transits, and other surveying instruments. The testing laboratory in the basement has a 150,000-pound Riehlé machine for tests of tension, compression, and flexure; a 2,000-pound Olsen cement machine, and smaller apparatus for special experiments on beams and columns. The Freshman drawing room of the Civil Engineering department is located on the fourth floor.

The second floor of this building is devoted to the class room and drafting work of the department of Mechanical

Engineering. Here are the various recitation rooms, and the well lighted and equipped drafting rooms for the several classes. Near these are the offices of the professor and instructors, the blue print room, and the reference library of the department with its large store of prints and working drawings. A wide range of machinery is illustrated by cuts and photographs on the walls. The drafting rooms are further equipped with an extensive assortment of machine parts in cases, with a full sized link motion constructed for Lehigh Valley Railroad practice, and with a small eight-wheel locomotive, which is an exact reproduction on a scale of one-sixth of a standard passenger locomotive, and which is noticeable for its exact workmanship and delicate finish.

On the third and fourth floors are to be found the lecture and drawing rooms of the department of Mining Engineering and Geology, the museum of geology and natural history, and other class-rooms.

THE CHEMICAL LABORATORY.

This is a thoroughly fire-proof building, built of sandstone, and 219 feet in length by 44 in width.

There are two principal stories and a basement. The upper floor is occupied by the quantitative and the qualitative chemical laboratories, the former accommodating 48 and the latter 84 students. These rooms are 22 feet in height, and are well lighted and ventilated. A laboratory for industrial chemistry and the supply room are also on this floor.

The first floor contains a large lecture room, a recitation room, a chemical museum, and laboratories for organic, physiological, agricultural, and sanitary chemistry.

In the basement is the large laboratory for the furnace assay of ores and a well appointed laboratory for gas analysis, also rooms containing the apparatus for several processes in industrial chemistry, the engine and air-pump for vacuum filtration, a store room, and the toilet.

A photographic laboratory is located in the third story of the central portion of the building.

THE METALLURGICAL LABORATORY

contains a lecture room, a blowpipe laboratory for class instruction in blowpipe analysis and in the practical determination of crystals and minerals, a museum for mineralogical and metallurgical collections, a mineralogical laboratory provided with a Fuess reflecting goniometer, a polariscope, a Groth's "universal apparat," and a Rosenbusch polarizing microscope, a dry laboratory provided with furnaces for solid fuel and for gas with natural draught and with blast, and a wet laboratory for ordinary analytical work. It is arranged for the instruction of classes in the courses of mineralogy, metallurgy, and blowpipe analysis of the regular curriculum, and to afford facilities to a limited number of advanced students for familiarizing themselves with the methods of measurement and research employed in mineralogy and metallurgy, and for conducting original investigations in these departments of science.

THE PHYSICAL LABORATORY.

This is a stone building, 235 feet long, 44 feet wide, and four stories high. On the first floor are the dynamo laboratory, the workshop, the battery room, and research rooms for thesis work. The dynamo laboratory is provided with a 50 horse-power steam engine and is well equipped with electrical machinery and measuring instruments. In the workshop a 6 horse-power electric motor drives three lathes, a drill-press, an emery grinder, and a buzz-saw; and an 80-cell storage battery is installed in the battery room.

On the second floor are the designing room, the beginnings of an electro-technical museum, the electrical laboratories, and a department library and reading room.

On the third floor are the physical lecture-room, with apparatus rooms adjoining, a large audience hall, and recitation rooms; and on the fourth floor are the laboratories for general physics, light, and photography, and two recitation rooms.

SAUCON HALL.

Extensive alterations to this building have recently been made, adapting it to the needs of the department of English. It is well warmed and lighted, and contains a study and a recitation room for each instructor, a hall for lectures seating 150 persons, a large room on the ground floor which has been fitted up for the use of the Debating Societies, with committee rooms adjoining, and the offices of the Brown and White. A set of rooms on the second floor has been set aside for the use of the Alumni, where they now have a comfortable office, a committee room, and a safe and commodious place for storing their archives. It is proposed to make further improvements in the building in the near future.

THE SAYRE OBSERVATORY.

Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument, and astronomical clock.

THE PACKER MEMORIAL CHURCH

is the munificent gift of Mrs. Mary Packer Cummings, daughter of the Founder of the University. It is one of the largest and most magnificent churches in the State, richly furnished and handsomely appointed in every particular.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall is the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter.

THE GYMNASIUM

is a handsome and spacious structure, built and equipped with the utmost thoroughness. It is furnished with the best patterns of gymnastic apparatus, besides Dr. Sargent's system of developing appliances. It is provided with hot and cold water; tub, sponge, and shower baths, and 389

clothes closets. Opportunities for recreation and amusement are provided in the bowling alleys. It is under the immediate care of a skilled and competent Instructor.

All students are required to undergo a physical examination before being allowed the use of the Gymnasium, and this examination will be repeated once each year during their stay at the University. The proper exercise is prescribed and is required of every student. These regulations are designed to promote the harmonious, symmetrical development of the individual student.

EXPENSES.

Books, materials, paper, pencils, materials used in the laboratories, and drawing instruments are furnished by the student. Materials consumed in the laboratories can be obtained from the University, their value being covered by a deposit made at the opening of that term in which the laboratory work is to be done.

Rooms and board cannot be had in University buildings, but can readily be obtained in many private houses.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included:

Tuition, ...	$100	$100
Board for 36 weeks, ... from	126 to	180
Room-rent, with fuel and light, . .	40 "	80
Care of room and use of furniture, . .	5 "	20
Washing and incidentals, ...	20 "	40
Books, stationery, etc, ...	25 "	50
Total, ...	$316 to	$470

(In the case of students in the School of General Literature, the charge for Tuition is $60, and the totals are $276 to $430.)

ADMISSION OF STUDENTS.

The Register is intended to give all necessary information concerning the admission of students. Application may be made to the President of the University if information is desired which is not given in the Register.

DATE OF EXAMINATIONS.

Examinations for admission to the University are held at the opening of each term, and also in June at the close of the academic year.

The examinations for 1898 will be on Thursday, Friday, and Saturday, January 27, 28, and 29, for admission to the second term; on Thursday, Friday, and Saturday, June 16, 17, and 18, and on Saturday, Monday, and Tuesday, September 17, 19, and 20, for admission to the first term. No other examinations for admission will be held, except for good cause, and all applicants *must* be in attendance at 8.30 o'clock on the morning of the first day.

The examinations are held in June and September in the following order:

First Day.—English, 8.30 A.M.; Physics, 2 P.M.; Latin and Roman History, 2 P.M.

Second Day.—Geometry, 8.30 A.M.; Physical Geography, 11.30 A.M.; United States History, 3 P.M.

Third Day.—Algebra, 8.30 A.M.; German or French, 2 P.M.; Greek and Greek History, 2 P.M.

The schedules of examinations for applicants for admission to the Freshman Class at the beginning of the second term and to the Sophomore Class at the beginning of the first term may be obtained from the Secretary of the Faculty. Examinations at other than the appointed times can not be granted without great inconvenience, and candidates so

applying will be required to pay a fee of $5 into the Faculty's fund for the aid of indigent students.

CHARACTER OF THE EXAMINATIONS.

The examinations are rigorous and cover the entire ground laid down in the following scheme. They are all conducted in writing, supplemented by an oral examination at the option of the examiner.

Each candidate for admission must be at least sixteen years of age, and must present a testimonial of good moral character from his last instructor, or from the school or institute to which he last belonged, or from some reputable citizen of the community in which he lives.

Candidates for admission to

THE CLASSICAL COURSE

are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books prescribed for admission to the colleges of the Middle States. These are, for 1898:

Milton's Paradise Lost, Books I and II; Pope's translation of the Iliad, Books I and XXII; the Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; Southey's Life of

Nelson; Carlyle's Essay on Burns; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables; Shakespeare's Macbeth; Burke's Speech on Conciliation with America; De Quincey's Flight of a Tartar Tribe; Tennyson's The Princess.

From one of the last four books in this list a theme will be taken for the composition which forms a part of the examination paper.

The student is also urged to the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

2. *History of the United States*, including the *Constitution*.

[Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement.]

3. *Algebra*. — Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Geometry*.—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of metrical units.

5. *Physical Geography*.

6. *Latin Grammar*.

7. *Cæsar*, four books of the Gallic war.

8. *Cicero*, six orations, including the four against Catiline.

9. *Vergil*, the first six books of the Æneid, including Prosody.

10. The translation, at sight, of passages from Cæsar and Cicero.

11. The translation of English into Latin. (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

12. *Roman History.*—Creighton, Pennell, or Myers.

13. *Greek Grammar.*

14. *Xenophon*, Anabasis, four books.

15. *Homer*, Iliad, first three books, including Prosody. The Catalogue of Ships may be omitted.

16. The translation, at sight, of a passage from some work of Xenophon.

17. *Greek History.*—Fyffe, Pennell, or Myers.

The pronunciation of Greek according to the written accents is followed in the University, and it is desirable that students preparing to enter be taught this system.

Latin is pronounced according to the method generally known as the Roman Method.

Candidates for admission to the Classical Course who have had, in their preparatory schools, no opportunity of studying Greek, will be admitted to that course in full standing upon presenting an amount of French or German equivalent to two years' work. They will begin Greek in the University and study it throughout the course, and will then receive the degree of B.A.

THE LATIN-SCIENTIFIC COURSE.

Candidates for admission to this course must present the first twelve of the above requirements, but substitute for

the Greek sections (numbers 13–17 inclusive) the following:

18. *German.*—This requirement will be satisfied by the completion of an amount equivalent to Part I. of Joynes-Meissner's or Calvin Thomas's Grammar, Buchheim's Reader, and additional reading.

[An equivalent amount of French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with additional reading.]

The candidate is expected to have acquired the ability to understand simple German (or French) prose, by the careful reading of about two hundred duodecimo pages, in addition to the study of Grammar. His proficiency will be tested by questions on the rudiments of grammar, by translations of simple English sentences, and by translations at sight of passages of easy German (or French) prose, containing no rare words.

THE COURSE IN SCIENCE AND LETTERS.

Candidates for admission to this course are examined in all the subjects demanded of those entering the Latin-Scientific Course, except the Latin and Physical Geography sections (numbers 5–12 inclusive). They also present the following:

19. *Elementary Physics.*

[Nichols's Outlines of Physics, Gage's Elements of Physics, or Avery's Elements of Natural Philosophy (revised edition).]

In 1899, and thereafter, candidates for admission to the Latin-Scientific course and to the course in Science and Letters will be examined in Solid Geometry, in addition to the subjects named above.

THE SCHOOL OF TECHNOLOGY.

Candidates for admission to the Courses in Civil Engineering, Mechanical Engineering, Mining Engineering, Electrical Engineering, and Chemistry, are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing,—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books prescribed for admission to the colleges of the Middle States. These are for 1898:

Milton's Paradise Lost, Books I and II; Pope's translation of the Iliad, Books I and XXII; The Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; Southey's Life of Nelson; Carlyle's Essay on Burns; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables; Shakespeare's Macbeth; Burke's Speech on Conciliation with America; De Quincey's Flight of a Tartar Tribe; Tennyson's The Princess.

From one of the last four books in this list a theme will be taken for the composition which forms a part of the examination paper.

The student is also urged to the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any courses except the Classical and the Latin-Scientific.

2. *History of the United States*, including the *Constitution*.

[Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement.]

3. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles. Solid Geometry.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of metrical units.

5. *Elementary Physics.*

[Nichols's Outlines of Physics, Gage's Elements of Physics, or Avery's Elements of Natural Philosophy (revised edition).]

6. *German.*—This requirement will be satisfied by the completion of an amount equivalent to Part I. of Joynes-Meissner's or Calvin Thomas's Grammar, Buchheim's Reader, and additional reading.

[An equivalent amount of French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with additional reading.]

The candidate is expected to have acquired the ability to understand simple German (or French) prose, by the careful reading of about two hundred duodecimo pages, in addition to the study of Grammar. His proficiency will be tested by questions on the rudiments of grammar, by translations of simple English sentences, and by translations at sight of passages of easy German (or French) prose, containing no rare words.

Division of Examinations for Admission.

Candidates for admission to the Freshman Class may pass all the examinations in June, or all in September, or partly in June and partly in September, or may take them in *two consecutive years*. In the latter case, for the Technical courses and the course in Science and Letters, candidates may present themselves for examination in the first year in the following subjects: English, History of the United States, and German. No credit will be given unless the candidate has passed satisfactorily in at least two subjects in one year.

The examinations in Algebra, Plane and Solid Geometry, and Physics must be passed in June or September of that year in which the candidate proposes to enter the University.

In the Latin-Scientific and Classical courses candidates may present themselves for examination in the first year in the following subjects: English, History of the United States, Physical Geography, Roman History, and Greek History. No credit will be given unless the candidate has passed at least three of the subjects in one year.

The examination in Latin may also be divided, but no credit will be given unless the candidate has passed in at least three of the topics specified at one examination. The examinations in the remaining subjects must be passed in June or September of that year in which the candidate proposes to enter the University.

Candidates intending to enter the University in September are advised to present themselves for examination in

June; if they are not fully prepared at that time they will receive credit for the examinations then satisfactorily passed.

CONDITIONAL ADMISSION.

A candidate failing to pass in one or more of the subjects required for admission may, at the discretion of the Faculty, be admitted to his class conditionally, to make up his deficiencies by extra study. When they are made up he will be received into full standing in his class.

SPECIAL STUDENTS.

Young men of advanced standing, who do not desire to take a full regular course, can enter and select special shorter courses, with the sanction of the Faculty; but in all cases satisfactory examinations must be passed upon the subjects required for entrance to the Freshman Class.

ADMISSION TO ADVANCED STANDING.

Candidates for admission to advanced studies *in any course* are required to pass, *in addition to the entrance examinations for that course*, examinations in the work already done by the classes which they desire to enter. These examinations are held on the same days as those for entrance to the Freshman Class.

The additional subjects may be found in the program of studies.

A diploma showing that a degree has been conferred, or a certificate of studies taken at another college will be received, in so far as it covers the subjects required for entrance, in lieu of the *Primary Entrance Examinations only*.

ADMISSION TO GRADUATE COURSES.

Students of this University who have taken their *first* degree, and others, on presenting a diploma of an equivalent degree conferred elsewhere, are admitted to advanced studies, according to the plan to be found in the Register under the general subject of Graduate Students.

PREPARATORY SCHOOL CERTIFICATES.

Certificates are not accepted from any schools in lieu of examinations as evidences of proficiency in Algebra, Geometry, or German, and they will not, as a rule, be accepted in any subject. It is, however, regarded as highly desirable that the examiners should receive from principals of preparatory schools statements with reference to those whom they send up as candidates for entrance, indicating as clearly and fully as possible, in each case, the teacher's opinion of the candidate's character and scholarship and fitness for entering upon collegiate work; **and such statements will receive careful consideration, in connection with the results of the entrance examinations.**

PROGRAM OF STUDIES.

Showing the number of Exercises per week for each subject and the Text-books Used.

The following is presented as the general program of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject ls indicated by the figure in parentheses immediately following.

Two hours of drawing, three of work in the laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

SCHOOL OF GENERAL LITERATURE.

There are three courses in the School of General Literature of the University.

I. The Classical Course includes all that is prescribed in our best institutions for the degree of Bachelor of Arts (B.A.). It covers full instruction in Greek, Latin, English, French and German, Mathematics, Astronomy, Physics, Chemistry, Geology, Physiology, Hygiene, History, Psychology, Ethics, Philosophy, and Political Economy.

II. The Latin-Scientific Course differs from the first in omitting Greek, taking in its place an increased amount of the Modern Languages and of Mathematics. Students completing this course receive the degree of Bachelor of Science (B.S.).

III. The Course in Science and Letters, for which the same degree is given as for the last mentioned, contains no Latin or Greek, but furnishes instead extended instruction in French and German, History, General Literature, Mathematics, and General Science.

Instruction in all of these courses is given both by recitations and by lectures.

A student taking a literary course will be permitted to substitute, at the discretion of the Faculty, studies offered in one or another of the technical courses for a portion of the required work during Junior and Senior years. Such a student will receive the literary degree at the end of the fourth year. If he then desires to pursue the remaining branches in the technical course, he may receive the appropriate degree as soon as this is completed. The amount of additional time thus occupied will be probably from one and a half to two years, depending upon the course selected and the diligence of the student.

It is believed that the benefit from such a combined course, which unites the advantages of literary training with those of a professional course, will recommend itself to many persons, and that the maturer condition of the student when he approaches his later work will enable him to make better use of the opportunities then afforded him.

DESCRIPTION OF THE COURSES.

Greek.—During the first term of Freshman year the class reads several books of the Odyssey, giving attention to epic forms and syntax, to prosody and scanning, and to Homeric antiquities and mythology. The work of the second term is directed toward a thorough acquaintance with the idiom and vocabulary of Attic prose, as a preparation for rapid reading. The Œconomicus and Symposium of Xenophon and the Crito of Plato are read during the term, with sight readings from the Memorabilia and the Apology; accompanied with discussions of domestic life at Athens. The work of the year includes a thorough re-

view-drill on the principles of Greek accidence and syntax, and exercises in Greek prose composition are required, based, during the second term, on the reading done by the class. Greek history is studied, during the second term, with special reference to the development of political institutions.

The Sophomore Class takes up, during the first term, the study of Herodotus and Thucydides. Selections are made from both authors with the purpose of illustrating their best style and, at the same time, of presenting, from the original sources, the history of certain interesting epochs; the reading from Herodotus, after some drill on the Ionic forms, being in large part at sight. During the second term the class reads one or two plays of Euripides, with attention to the history of Greek tragedy, the life of the author, and the analysis of the drama read. The lyric meters are studied, with the aim of gaining a knowledge of the rhythmical and metrical principles of Greek poetry. During this term an elective course is offered, the subject being Greek oratory, with the reading of certain orations of Lysias or Demosthenes, or both.

The Junior year is devoted to a further study of the drama, selected plays of Sophocles, Aristophanes, and Æschylus being read during the year. Work is also done in the study of public and private antiquities, partly in lectures by the professor and partly in original investigation on allotted subjects by the students.

During the first term of the Senior year the class reads either selections from Thucydides, or one of the dialogues of Plato. The second term is in part devoted to the reading of selected odes of Pindar, with careful study of the history of Greek lyric poetry and of the life and work of Pindar in particular. The course concludes with a review of the history of Greek literature, intended to summarize and harmonize the fragmentary views of the general subject gained from the study of particular authors and departments of literature.

Students who have presented a modern language for admission instead of Greek will, during Freshman and Sophomore years, cover the ground laid down in the entrance requirements. During Junior and Senior years they will take the Freshman and Sophomore courses, as outlined above.

LATIN.—Much of the training in the Freshman year is devoted to laying a good foundation in Latin grammar and in the translation of English into Latin. The authors studied are used to illustrate both of these, and a large amount is read at sight in order to cultivate quickness and readiness in the student. Roman history is begun, accompanied with full comments and lectures upon points of interest. Collateral reading will also be recommended each year throughout the course. Cicero: De Senectute and De Amicitia or the Philippics, Livy, and the Odes and Epodes of Horace are read this year. With the last named, training is given in Latin meters.

During this and the following year courses of lectures are given upon Roman antiquities in addition to a text-book. The topography of Rome with its remains, ancient life in its various aspects, and the other departments of archæology are discussed, illustrated by the new and extensive set of over 3,600 magic lantern slides which have been prepared for this purpose.

The Sophomore year completes the text-book on Roman history. The Satires and Epistles of Horace are read in the first term, and in the second the Agricola and Germania, with selections from the Annals of Tacitus, or Quintilian, together with sight reading.

In the Junior year, selected letters of Cicero and Pliny are read, followed by Persius and several plays of Terence and Plautus. The history of Roman literature is entered upon in the second term.

The work in the Senior year opens with Lucretius, accompanied with lectures on Roman philosophy. The course in the second term this year includes the study of ancient Latin, using Allen's Remnants of Early Latin,

supplemented by a series of lectures upon Latin Grammar and the history of the development of the language, together with several lectures upon the history of classical philology. Characteristic poems by various authors will be read with full comment and training in the discussion of the literary and critical points which come up.

ENGLISH.—During the first term, Freshman year, Rhetoric is studied, both with the aid of a text-book and through practical exercises, with the design of stimulating invention and imparting the essentials of a clear prose style. In the second term, a brief history of the language is made the nucleus of work. A general view of American literature is given in weekly lectures.

The Sophomores spend the first term in a careful study of all that is most typical in English literature; the second, in a critical study of the prose of DeQuincey, Macaulay, and Carlyle, following that with a rapid survey of English prose from the XIV to the XIX century.

The Juniors study models of the best Oratory, both English and American, as a preliminary to the writing and delivery of original orations at some time during the first term; and, during the second, specimens from the works of standard Essayists as models for original essays; with these alternate critical studies of the Elizabethan Drama. Careful training is given in the writing and criticism of essays throughout the course. These will be frequent rather than long; on subjects partly literary and in part technical; and the student will be led to maintain a specific thesis with orderly balance of arguments and arrangement of parts.

Excellence in Oratory is encouraged by the annual contest for the Alumni Prizes, held on the 22d of February, and open to students of the Junior class in all courses.

Instruction in elementary Anglo-Saxon is given regularly for one term to the Juniors in the School of General Literature, to be followed in the next term by a more critical study of the philology and history of the language than would be possible without such an introduction.

Seniors in the same school receive instruction in the early English of Chaucer and his contemporaries, and in the principles and practice of versification. They are required to write a short poem, or a critique of some book, of a purely literary cast, selected for their examination and review. The course is completed by a series of lectures on the English poets from Chaucer to Tennyson, and, later, by lectures on special topics in English Literature too important to be passed over with brief mention, yet too comprehensive to be treated earlier in the course. Topics for 1898 will be taken from the following list: (1) The Transition from Anglo-Saxon to English Literature. (2) Wycliffe and the English Bible. (3) Chaucer's Canterbury Tales. (4) Langland's Vision of Piers the Plowman. (5) Gower. The Condition of England, Social and Literary, in 1400. (6) The Unproductive Period after the death of Chaucer. Early Scottish Poetry.

Optional courses will be offered as occasion arises. A Reading Club will be formed, and the student will be encouraged to such private and supplementary reading as his time will permit, and to the formation of a small library of standard books.

Modern Languages.—The study of modern languages is obligatory from the first term of the Sophomore year up to the close of the course. The student elects either French or German; or both, if time permits.

French.—The grammar is begun, reading being introduced immediately. The comparative and historical relations of the French to the English, and the connections of both with the Latin are carefully explained. As soon as possible, the student is emancipated from the Reader and takes up, in a progressive way, the reading of different authors; preference being given to modern writers, because it is considered to be of the highest importance that he acquire the language as it is, as an instrument whereby further knowledge can be obtained.

In the class-room, the language taught is used by the

teacher as much as possible, in order that the ear of the pupil may became accustomed to its sound. Dictation is also employed, in order to give training in spelling. The rules of grammar are taught by numerous written exercises. In the second term of the Junior year, compositions in French are required, upon subjects which have been previously explained in French, in order that the student may become acquainted with different expressions and forms of construction. Before entering upon the study of an author's works, his life and literary achievements are discussed in French, which is translated, if necessary. In the Senior year, twelve lectures are delivered upon the history of French literature. In addition to this, lectures in French upon the most distinguished modern authors are given to advanced students.

A weekly conversation-class affords opportunity for this kind of practice; and in it the events of the day and various historical and literary topics are discussed. Private courses of reading are also suggested to those who desire it.

German.—The German course follows the same plan as that laid down for the French, both as regards the methods employed and the opportunities afforded. The relations of English and German are dwelt upon and also those which connect the two languages with the Indo-European family.

MATHEMATICS.—While preparation in solid geometry is not at present required for entrance to the literary courses, it will be found of advantage for those who propose to take one of these courses to study that subject, if opportunity offers, at the preparatory school. They will in that case be able to pursue the study of mathematics in the University in the same order as those who are taking technical courses. For those who have not studied solid geometry before entrance, the mathematical work is carried on during the Freshman and Sophomore years as follows:

Freshman year, first term, solid geometry, four exercises per week; plane trigonometry begun.

Second term, analytical geometry; plane and spherical

trigonometry, including mensuration and use of logarithmic tables: together five exercises per week throughout the term.

Sophomore year, first term, higher algebra, three exercises per week.

Opportunity for the study of more advanced mathematics is given in the elective work of the Junior and Senior years.

ASTRONOMY.—This study is taken up as an elective during the second term of the Junior year. There are three exercises a week, and visits to the observatory help to make the work interesting as well as profitable.

CHEMISTRY.—This study includes a complete course of lectures in Sophomore year upon general inorganic chemistry, in which the principles of the science are fully covered. These are illustrated by experiments, and are sufficiently extended to enable a student who desires to pursue the subject further to take analytical chemistry as an elective in the second term of the Sophomore year. The text-book used in connection with the lectures is Remsen's Inorganic Chemistry. There is also a course of experimental chemistry in the laboratory of six hours per week.

PHYSICS.—The complete and thorough course in this subject which is given to students in the School of Technology is offered as an elective in the classical course and is required as a part of the other literary courses. It extends over a year and a half, and covers the topics of Mechanics, Light, Heat, Sound, Electricity and Magnetism. The subject is presented in lectures, supplemented with recitations and laboratory practice.

GEOLOGY.—In the second term of the Senior year a course of lectures is given in connection with Le Conte's text-book. The general principles of the science are explained, and the theories of the formation and stratification of rocks, the successive periods of the development of the earth's crust, the extinct forms of life and similar questions are treated.

PHYSIOLOGY AND HYGIENE.—These subjects are taught in a course of lectures during the Freshman year.

HISTORY.—The study of history begins with a course in the history and antiquities of Greece and Rome. [See the Departments of Greek and Latin.] This is followed by the study of an outline of universal history (with text-book), and this by a fuller study of the political history of recent times, especially of that of England and France. During the Senior year there is a course of lectures upon American Political and Industrial History.

POLITICS.—Study of the Federal, State, and Municipal Governments. Comparisons of the politics of Germany, England, and the United States.

ECONOMICS.—The courses at present given in this department are as follows:

A. *Elementary Economics.*—Description of Modern Business Organization. Analysis of the Concepts of Wealth, Capital, Value, etc. Cannan: Elementary Political Economy.

B. *Economic Problems.*—Money, Trusts, Protection and Free Trade, Corporations, Trades Unions, Socialism, Anarchism.

LOGIC.—Junior Class, first term, two hours weekly. Text-book, Prof. Jevons' "Lessons in Logic," supplemented by occasional lectures and by references to more extended logical treatises, such as those of J. S. Mill, Sir William Hamilton, Archbishop Thompson, Baynes' Port Royal Logic, etc.

MENTAL AND MORAL PHILOSOPHY.—The work in this department will be conducted chiefly by lectures, interrupted by occasional examinations. The courses at present are the following:

Outlines of Physiological Psychology.—Junior Class, second term. These lectures are founded principally on Wundt's lectures on the same subject, Wundt's Grundzüge der Physiologischen Psychologie, James' Psychology, Bald-

win's Handbook, Ladd's Elements of Physiological Psychology, Lotze's "Medicinishe Psychologie," Ranke's "Der Mensch," Sully's Outlines of Psychology, Carpenter's Mental Physiology, Maudsley's Physiology and Pathology of the Mind, Bain's Mind and Body, etc., with references to the classical works of Weber, Fechner, and Helmholtz.

The History of Philosophy.—Senior Class, both terms. First Term, Ancient and Medieval Philosophy. Second term, Modern Philosophy. These lectures will include a statement of the conception and problems of philosophy, a brief sketch of the great ethnical religions, and of the history of Oriental philosophy. The philosophy of the Greeks will be treated in detail, with illustrations from the writings of the philosophers.

The history of medieval philosophy will be prefaced by a short description of the philosophical ideas underlying Christianity, and it will contain an account of the more important Church Fathers and Schoolmen.

The history of modern philosophy will begin by tracing the effect on philosophical thought of the ideas contributed by the Renascence and by the Reformation. From Lord Bacon on, a detailed history of the great modern philosophical systems will be given, which will be continued to those of our own times, including that of Mr. Spencer.

ANTHROPOLOGY.—Senior Class, both terms. These lectures aim at laying the foundation of a scientific study of Man. They include the rudiments of anthropometry and craniology. The earlier lectures give an account of the development, structure, and life of the human body; while the later lectures endeavor to describe the salient peculiarities of existing and prehistoric races of men.

They are based, for the most part, on the works of Bischoff, Broca, Darwin, Hartmann, Haeckel, Huxley, Quételet, Ranke, Virchow, etc.

CHRISTIAN EVIDENCES.—Senior Class, second term. Lectures on Christian evidences, which will endeavor to

treat of the subject both from the side of natural science and from that of biblical criticism.

No complete course in Ethics has as yet been established, but the history of ethics is included in the history of philosophy.

THE COURSE IN SCIENCE AND LETTERS

substitutes the following for the Latin and Greek:

DRAWING.—In the first term of the Freshman year the student is instructed in elementary projections, shading, and lettering.

CHEMISTRY.—In addition to the course in general chemistry described above, three exercises a week in qualitative analysis are taken in the second term of the Freshman year.

MINERALOGY.—Instruction in mineralogy is given to the students in the Course of Science and Letters throughout the Junior year. In the first term they attend a course of lectures on crystallography, followed by a series of practical exercises in the determination of crystalline forms by the aid of models and natural crystals.

In the second term a course on the physical properties of minerals and on descriptive mineralogy, with the use of E. S. Dana's Text-Book of Mineralogy, is followed by practical exercises in the determination of minerals.

GEOLOGY.—The study of lithology is pursued in the first term of the Senior year, with laboratory practice, Williams' Lithology being used as the text-book. During the next term the course given above is taken with the Classical and Latin-Scientific students.

THE CLASSICAL COURSE.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

Greek.—Homer: Odyssey. Prosody. (4)

Latin.—Cicero: De Senectute and De Amicitia. Livy begun. Prose composition. (4)

English.—Rhetoric. (2) Lecture. (1) Essays.

Physiology and Health.—Lectures. (1)

SECOND TERM.

Mathematics.—Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2) Analytical geometry. (3)

Greek.—Xenophon: Œconomicus. (3)

Latin.—Livy completed. Horace: Odes and Epodes. Composition and prosody. (4)

History.—History of Greece. (2) History of Rome. (1) Roman antiquities. (1)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (2) Laboratory. (2)

French.—Whitney's Practical French Grammar. Super's French Reader. (2) Or *German.*—Brandt's Grammar. Lodeman's Manual of Exercises. Buchheim's Reader. (2)

Greek.—Herodotus. (3)

Latin.—Horace: Satires and Epistles. Composition. (3)

History.—History of Rome. (1)

English.—English literature. (2) Essays.

SECOND TERM.

REQUIRED.

French.—Grammar and reader (continued). (2) Or *German.*—Grammar, exercises, reader (continued). (2)

History.—Weber's Outlines of Universal History. (2)

Greek.—Euripides: Medea. (3)

Latin.—Tacitus: Agricola, Germania, and Annals, or Quintilian: Book X. Composition. (3) Antiquities.
English.—English prose literature. (2) Essays.

ELECTIVE.

(*At least four hours per week to be selected.*)

Greek.—Demosthenes: De Corona. (2)
Latin.—Plautus. (2)
French.—Grammar and reader. (2)
German.—Grammar and reader. (2)
Physics.—Mechanics. (3)
Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)
Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (4)
Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)
Drawing.—Tracings and blue prints. Sections of simple construction. Intersection of spheres, cones, cylinders, etc., illustrated from examples of mining and metallurgical plant. (4)

JUNIOR CLASS.

FIRST TERM.

REQUIRED.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2)
Philosophy.—Jevons's Lessons in Logic. (2)
English.—English and American Orators. (1)
French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2) Or *German.*—Grammar. Beresford-Webb: German Historical Reading Book. (2)

ELECTIVE.

(*At least eight hours per week to be selected.*)

English.—Anglo-Saxon. (2)

Greek.—Sophocles: Antigone. Antiquities. (3)

Latin.—Letters of Cicero and Pliny. (3)

Mathematics.—Elementary mechanics; calculus begun. (5)

Pedagogics.—Elementary course. (2)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Toxicology.—Lectures. (2)

SECOND TERM.

REQUIRED.

History.—American Political and Industrial History. (2)

Philosophy.—Lectures on the outlines of physiological psychology. (2)

English.—British Essayists. (1)

French.—Dictation. Compositions. Short stories by François Coppée and Guy de Maupassant. Taine: Les Origines de la France contemporaine. Mérimée: Colomba. (2) Or *German.*—Jageman's Prose Composition. Dictation. Goethe: Hermann und Dorothea. Freytag: Aus dem Staate Friedrichs des Grossen. (2)

ELECTIVE.

(*At least eight hours to be selected.*)

English.—Philology of the English tongue. (2)

Greek.—Aristophanes: Clouds. Æschylus: Prometheus. (3)

Latin.—Persius, Plautus and Terence. History of Roman literature. (3)

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Astronomy.—Descriptive astronomy. (3)

Physics.—Electricity and magnetism, light, sound. (3)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. E. S. Dana. (3)

Blow-Pipe Analysis—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

SENIOR CLASS.

FIRST TERM.

REQUIRED.

Politics.—Study of governments. (2)

Economics.—Elementary economics. (1)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

French.—Composition. Dictation. Readings in Corneille, Racine, Molière, Victor Hugo, Alfred de Musset, and contemporary authors. Lectures on French literature. (2) Or *German.*—Grammar. Readings in Lessing, Herder, Goethe, Schiller, etc., and contemporary authors. Compositions. Lectures on German literature. (2) Conversation class in both languages optional throughout the year.

ELECTIVE.

(*At least eight hours to be selected.*)

English.—Chaucer and his contemporaries. (2)

Greek.—Plato: Phædrus. Greek philosophy. (2)

Latin.—Lucretius, with lectures. Roman literature. (2)

Bibliography. (2)

Astronomy.—Practical astronomy; observatory work. (2)

Mathematics.—Theory of errors and least squares, or differential equations. (2)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Mechanics of Machinery.—Herrmann-Smith. Graphical Statics of Mechanisms. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reportson experimental tests. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis, and Conference. (6)

SECOND TERM.

REQUIRED.

Economics.—Economic problems. (1)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

French.—Readings. Compositions. Lectures in French on modern French authors. (2) Or *German.*—Readings. Compositions. Lectures in German on modern German authors. (2)

Geology.—Lectures. LeConte. (3)

ELECTIVE.

(*At least eight hours to be selected.*)

English.—Study of Verse. (2)

Greek.—Pindar: selected odes. Greek literature. (2)

Latin.—Cicero: De Officiis. Lectures on the history of classical philology. (2)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Steam Engine.—Holmes' Steam Engine. (4)

Quantitative Analysis.—Fresenius' Quantitative Analysis, and Conference. (6)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Preparation of Thesis.

THE LATIN-SCIENTIFIC COURSE.

The Latin-Scientific Course, leading to the degree of Bachelor of Science (B.S.), is based on Latin without Greek.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

German.—Review of Grammar, especially as to syntax. Jageman's Prose Composition. Short stories by different modern authors. (3)

Latin.—Cicero: De Senectute and De Amicitia. Livy begun. Prose composition. (4)

English.—Rhetoric. (2) Lecture. (1) Essays.

Physiology and Health.—Lectures. (1)

SECOND TERM.

Mathematics.—Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2) Analytical geometry. (3)

German.—Prose composition. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Dictation. (3)

History.—History of Greece. (2) History of Rome. (1) Roman antiquities. (1)

Latin.—Livy (completed). Horace: Odes and Epodes. Composition and prosody. (4)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (2) Laboratory. (2)

French.—Whitney's Practical French Grammar. Super's Reader. (2)

German.—Readings in Lessing, Herder, Goethe, Schiller, and contemporary authors. Dictation. Compositions. (2) Conversation class in German optional throughout the year.

History.—History of Rome. (1)

Latin.—Horace: Satires and Epistles. Composition. (3)

English.—English literature. (2) Essays.

SECOND TERM.

French.—Grammar. Reader (continued). (2)

German.—Readings (continued). Dictation. Compositions. (2)

History.—Weber's Outlines of Universal History. (2)

Latin.—Tacitus: Agricola, Germania, and Annals, or Quintilian: Book X. Composition. (3) Antiquities.

English.—English prose literature. (2) Essays.

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (4)

JUNIOR CLASS.

FIRST TERM.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2)

Philosophy.—Jevons's Lessons in Logic. (2)

Pedagogics.—Elementary course. (2)

English.—Anglo-Saxon. (2) English and American Orators. (1)

French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2)

German.—Readings (continued). Composition. Lectures on German literature. (2)

Latin.—Letters of Cicero and Pliny. (3)

SECOND TERM.

History.—American Political and Industrial History. (2)

Philosophy.—Lectures on the outlines of physiological psychology. (2)

English.—Philology of the English tongue. (2) British Essayists. (1)

Astronomy.—Descriptive astronomy. (3)

Physics.—Mechanics. (3)

French.—Prose composition. Labiche et Martin: Le Voyage de M. Perrichon. Short stories by François Coppée and Guy de Maupassant. Dictation. (2)

Latin.—Persius, Plautus and Terence. History of Roman literature. (3)

NOTE.—Calculus may be substituted for Latin throughout the Junior year.

FIRST TERM.

Politics.—Study of governments. (2)

Economics.—Elementary economics. (1)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

Physics.—Heat, electricity and magnetism: lectures and recitations. (3) Mechanics, heat: laboratory. (1)

French.—Readings in Corneille, Racine, Molière, etc., and contemporary authors. Lectures on French literature. (2)

English.—Chaucer and his contemporaries. (2)

Latin.—Lucretius, with lectures. Roman literature. (2)

Bibliography. (2)

SECOND TERM.

Economics.—Economic problems. (1)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

Geology.—Lectures. Le Conte. (3)

Physics.—Electricity and magnetism, light, sound. (3)

English.—Study of Verse. (2)

Latin.—Cicero: De Officiis. Lectures on the history of classical philology. (2)

French.—Readings (continued). Compositions. Lectures in French on modern French authors. (2)

Preparation of Thesis.

COURSE IN SCIENCE AND LETTERS.

The Course in Science and Letters, leading to the Degree of Bachelor of Science (B.S.), is designed for those who wish to pursue both scientific and literary studies without Latin and Greek. These being omitted, extended instruction is given in French and German, History, General Literature, Mathematics, and General Science.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Solid geometry. (3) Plane trigonometry. (1)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (2) Laboratory. (2)

German.—Review of Grammar, especially as to syntax. Jageman's Prose Composition. Short stories by different modern authors. (3)

Drawing.—Freehand sketching and lettering. (2)

English.—Rhetoric. (2) Lectures. (1) Essays.

Physiology and Health.—Lectures. (1)

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

Physics.—Mechanics. (3)

German.—Prose composition. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. (3)

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Algebra. (3)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3). Mechanics, heat. Laboratory. (1).

Chemistry.—Fresenius's Quantitative Analysis. (3)

French.—Whitney's Practical French Grammar. Super's Reader. (2)

German.—Readings in Lessing, Herder, Goethe, Schiller, and contemporary authors. Dictation. Compositions. (2) Conversation class in German optional throughout the year.

English.—English literature. (2) Essays.

SECOND TERM.

Physics.—Electricity, magnetism, light, sound. (3)
Steam Engine.—Holmes's Steam Engine. (4)
French.—Grammar. Readings (continued). (2)
German.—Lessing, Herder, Goethe, Schiller, Heine, etc. Compositions. (2)
History.—Weber's Outlines of Universal History. (2) History of Greece. (2) History of Rome. (1)
English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

History.—Wilhelm Müller's Political History of Recent Times, and lectures. (2) History of Rome. (1)
Philosophy.—Jevons's Lessons in Logic. (2)
Pedagogics.—Elementary course. (2)
English.—Anglo-Saxon. (2) English and American Orators. (1)
French.—Grammar. George Sand: La Mare au Diable. Theuriet: Bigarreau. (2)
German.—Readings (continued). Compositions. Lectures on German literature. (2)
Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

SECOND TERM.

History.—American Political and Industrial History. (2)
Philosophy.—Lectures on the outlines of physiological psychology. (2)
English.—Philology of the English tongue. (2) British Essayists. (1)
French.—Prose Composition. Labiche et Martin: Le Voyage de M. Perichon. Short stories by François Coppée and Guy de Maupassant. Dictation. (2)
Astronomy.—Descriptive astronomy. (3)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. (3)

SENIOR CLASS.

FIRST TERM.

Politics.—Study of governments. (2)

Economics.—Elementary economics. (1)

Bibliography. (2)

Philosophy.—Lectures on the history of ancient and medieval philosophy. (2)

English.—Chaucer and his contemporaries. (2)

French.—Readings in Corneille, Racine, Molière, etc., and contemporary authors. Compositions. Lectures on French literature. (2)

Astronomy.—Practical astronomy. (2)

Geology.—Williams' Lithology, and laboratory practice. (2)

SECOND TERM.

Economics.—Economic problems. (1)

Philosophy.—Lectures on the history of modern philosophy. (2)

Christian Evidences.—Lectures. (1)

English.—Study of Verse. (2)

French.—Readings (continued). Compositions. Lectures in French on modern French authors. (2)

Geology.—Historic and dynamic geology. LeConte. (3)

Preparation of Thesis. (4)

THE SCHOOL OF TECHNOLOGY.

This school includes six distinct courses:

I. The Course in Civil Engineering.
II. The Course in Mechanical Engineering.
III. The Course in Metallurgy.
IV. The Course in Mining.
V. The Course in Electrical Engineering.
VI. The Course in Chemistry.

These have the same curriculum of studies for the first term of the Freshman year. After the first term the student follows the program of the course which he has selected.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Algebra. (3) Plane trigonometry. (1)
Chemistry.—Lectures. Remsen's Inorganic Chemistry. (2) Laboratory. (2)
German.—Review of Grammar, especially as to syntax. Jageman's Prose Composition. Short stories by different authors. (3) Or *French.*—Review of Grammar, especially as to syntax. George Sand: La Mare au Diable. Theuriet: Bigarreau. Short stories by François Coppée and Guy de Maupassant. (3)
Drawing.—Free-hand sketching and lettering. (2)
English.—Rhetoric. (2) Lecture. (1) Essays.
Physiology and Health.—Lectures. (1)

THE COURSE IN CIVIL ENGINEERING.

The special technical studies in this course may be grouped under the heads of Surveying, Applied Mechanics, Road and Railroad Construction, Bridge Design, and Hydraulic and Sanitary Engineering.

The work in Surveying extends over four terms and embraces land surveying, leveling, topography, triangulation, railroad reconnaissance and location, hydrography, and the elements of geodesy. A large equipment of transits, levels, and other surveying tools affords students the opportunity of becoming familiar with the instruments of different manufacturers. Much time is devoted to practice in the field and drafting room, each student being required to become proficient in the use of instruments, in taking field notes, and in map-drawing. Particular attention is paid to the execution of topographical surveys and maps by the best modern methods. Railroad maps and profiles are made from actual field location. During the Junior year there is done secondary triangulation work of a high order of precision.

The work in Applied Mechanics comprises the strength and elasticity of materials, the theory of the equilibrium of arches, roofs, and bridges, that part of the mechanics of machinery which relates to locomotives and hoisting machines, and the theory of hydraulics and hydraulic motors. Here the theoretical principles are illustrated by examples and problems taken, as far as possible, from actual engineering practice. Tests and experiments on materials are made in the testing laboratory.

The course in Construction familiarizes the student with the qualities of materials used in engineering structures, with methods of preservation and testing, with masonry and foundations, and with the building and maintenance of roads and railroads. All the standard tests for hydraulic cements and mortars are made by each student.

The course in Bridge Design is preceded by the theory of computation of stresses by both analytical and graphic methods. Starting with the specifications for a first-class iron highway or railroad bridge, each student then makes the full computations, designs, working drawings, and bills of material for a plate girder, a lattice girder, and a pin-connected truss bridge. The weight of the designed bridge is finally determined and compared with the dead load

assumed for the calculations. The drawings are made and dimensioned in the same manner as in the drafting-office of a bridge company. In connection with this course visits of inspection to bridges in the vicinity are regularly made.

The work in Hydraulic and Sanitary Engineering includes the study of systems of water supply, the collection, purification, and distribution of water, the combined and the separate systems of sewerage, the methods for the disposal of sewage, and the best practice for the drainage of houses. There is also a course on the flow of water in pipes and channels, together with the discussion of hydraulic motors.

Besides these special studies there is a course in astronomy, which includes practical work in the observatory. The study of English, and of French or German, is continued, and instruction is given during four terms in crystallography, mineralogy, lithology, and geology.

The student who completes all the studies of this course will receive the degree of Civil Engineer (C.E.).

Opportunities for graduate study are offered by this department in the following subjects: Theory of Elasticity and Strength of Materials, Bridge Engineering, Railroad Engineering, Hydraulic and Sanitary Engineering, Geodesy and the Figure of the Earth.

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics—Mechanics. (3)

Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Architectural Drawing.—Plans of piers and arches. Problems in stone cutting. Use of water colors. (3)

Construction.—Materials, masonry, and carpentry. Roads, streets, and pavements. Sketches of structures. (3)

English.—English literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus completed. Analytical mechanics. (5)

Land Surveying.—Theory and use of compass, level, and transit. Surveys and maps of farms. Leveling. (4)

Physics.—Electricity and magnetism, light, sound. (3)

Steam Engine.—Holmes's Steam Engine. (3)

English.—English prose literature. (2) Essays.

SUMMER SCHOOL.

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographic maps.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Theory of errors and least squares. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Construction.—Foundations, arches, walls, dams, and bridges. Visits of inspection. (4)

Geodetic Surveying.—Field work in precise triangulation. Use of solar transit. Lectures on geodesy. (3)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Economics.—Elementary course. (1)

English.—English and American Orators. (1)

SECOND TERM.

Astronomy.—Descriptive astronomy. (3)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Roofs and Bridges.—Theory and calculations of stresses in roof and bridge trusses. (5)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. (3)

English.—British Essayists. (1)

Christian Evidences.—(1)

SENIOR CLASS.

FIRST TERM.

Astronomy.—Practical astronomy. Observatory work. (2)

Graphic Statics.—Analysis of roof and bridge trusses. (2)

Bridges.—Design of plate girders, riveted bridges, and pin-connected trusses, with working drawings. (6)

Hydraulics.—Hydrostatics. Efflux of water from orifi-

ces and flow in pipes and rivers. Hydraulic motors. (3)

Mechanics of Machinery.—Pile drivers, cranes, and elevators. The mechanics of the locomotive. (2)

Geology.—Williams' Lithology, with practical exercises in determining rocks. (2)

SECOND TERM.

Bridges.—Theory of cantilever, draw, continuous, suspension, and arched structures. (3)

Sanitary Engineering.—Collection, purification, and distribution of water. Systems of water supply and sewerage. Disposal of sewage. House drainage. Irrigation engineering. (4)

Contracts and Specifications. — Business practice and law. (2)

Electricity.—Equipment and operation of electric railways. Measurement of power. (2)

Geology.—Historic and dynamic. Le Conte. (3)

Preparation of Thesis. (3)

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines. The principal subjects taught are: the nature, equivalence, and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, mechanical technology, the principles and practice of machine design, and the measurement of power.

Through the kindness of the officers of the Lehigh Valley Railroad Company and of the officers of the Bethlehem Iron Company, the students of the Lehigh University have access to all the shops of the Railroad from New York to Buffalo and to all the departments and shops of the immense Iron Works, in which the iron and steel industry has reached its highest development in this country. In this manufacture may be seen every process, from the smelting of the ore to the finishing of great shafts, cranks, and

armor plates for the navies of the world, and to the finishing of 16-inch breech-loading rifled guns for the War Department of the United States. These extraordinary privileges are thoroughly appreciated by the Mechanical Engineering Department and are utilized in every part of its work.

The earliest shop visits are for the purpose of acquainting beginners with machine parts and the usual tools of a shop. These visits are a part of the work of a Summer School, lasting four weeks, which is held at the close of the second term of Freshman year. A classified and numbered list of some three hundred and sixty items is given to each student, who makes a written report on them with free-hand sketches containing the leading dimensions. The class is divided into sections, which are separately taken into the shops by the instructor, who then indicates the pieces that are to be examined and gives all necessary explanations. Thus at the very beginning of the course the student is brought into direct contact with the elements of machinery and the common resources of the shop, becomes familiar with technical terms, and is in a position to understand and appreciate subsequent instruction.

In this same Summer School the students of Mechanical Engineering are also given a course in the examination of the mechanical construction of electrical instruments and machinery and in the inspection of their use and operation in electrical plants. This is regarded as a very desirable preliminary to the study of Physics and to the special course in Electrical Engineering which they pursue later on.

That the students may obtain the practical engineering data which they will most need when beginning their work as mechanical engineers they are next required to pursue a course of shop instruction (Mechanical Technology), which does not necessarily involve manual labor and manipulation of tools, but is principally devoted to familiarizing them with those points in pattern-making, moulding,

forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is, therefore, directed to the forms and sizes of machine parts that can be readily constructed in the various workshops; to the time that it takes to perform, and the order of, the various operations; to the dimensions most needed by workmen, and to the various devices for increasing the accuracy of the work, durability of the parts, and convenience of manipulation.

That the students may learn to observe carefully and be trained to think and observe for themselves in these matters, there is required of them a full description of the various processes, operations, and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings, and finished pieces, which are not under construction in the shops at the time and the drawings for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed program given him at the start, but also personally by a teacher, who accompanies him in each shop, gives necessary explanations, and tests the extent and accuracy of his knowledge. Three teachers are engaged in this work, one for each shop and section. Hereafter this study of Mechanical Technology will be carried on in a Summer School lasting four weeks, which will be held at the end of the Sophomore year.

During the course there are frequent visits of inspection to the Bethlehem Iron Company, to the L. V. R. R. shops at Easton, and to other engineering works both in and out of town, with special reference to such subjects as prime movers, machinery for lifting, handling, and transporting, and machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students. These visits are also made the occasion for continued practice in the free-hand sketching of machinery.

The instruction in Machine Design begins with the sec-

ond term of the Freshman year and is continued throughout the course. At first tracings and blue prints of good examples of drawings of machinery are made. A thorough drill in projection drawing follows; in this work free-hand sketches are first made, and measurements taken, of machine pieces; these sketches are then converted into full-size working drawings. Then there is considerable practice in the interpretation of such drawings, and general views of lathes, planers, drills, and shapers are made from the drawings of the details. This is followed by difficult projections and intersections and exercises in the empirical proportioning of machine parts. Both empirical and rational formulas are used to determine the dimensions of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers and connecting rods, the data being given as they would arise in practice and the drawings made full size. During the Junior year the class takes up the design of a high-speed steam engine, every dimension being determined by the students and complete drawings made. During the Senior year the students undertake the calculations, estimates, and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. In the case of these machines and of the engine the general plan of arrangement will be given to the students in the form of rough sketches, photographs, or woodcuts. In the last term the students are expected to make original designs for simple machinery, whose object has been fully explained. Throughout the course the work in the draughting-room is carried on as nearly as possible like that of an engineering establishment, and special attention is paid to methods of expediting the work of calculation by means of simple formulas, tables, and diagrams.

The students in Mechanical Engineering are given a special course in Electrical Engineering after they have finished the regular and general course in Physics. The object is to impart a clear conception of electrical units and

a working knowledge of resistance, impedance, inductance, reactance, capacity, and the magnetism of iron, and the magnetic circuit as used in the construction of electrical machinery. Attention is then directed to the theory and calculation of direct current dynamos, to the study of variable and alternating current phenomena, and to the theory of the alternating current transformer. Practical problems are given in these subjects to show their application. The laboratory work which accompanies this special course involves tests of resistance, insulation, consumption of energy, and efficiency. Instruction is also given in locating and remedying the common faults of dynamos and motors.

The course in measurement of power involves much practice with the indicator. Cards are taken from the many types of engines running in the shops and power houses of the vicinity, and thorough drill is given in working up and interpreting these cards. There are also experiments with dynamometers of the friction-brake, belt, float, and cradle varieties. The work in boiler testing usually includes a test of the boilers of the University, a combined engine and boiler test at one of the silk mills, and a test of the boilers and pumping engine of the Water Works. With the engines belonging to the University tests of governor action are made. In addition there are experiments with calorimeters, duty tests of injectors and small pumps, and practice in gas and coal analysis.

All the students in this course are required to study both German and French.

The graduates in this course will receive the degree of Mechanical Engineer (M.E.).

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and

spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SUMMER SCHOOL.*

Visits of Inspection.—Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers, and connecting rods. (3)

* Optional in 1898.

Boilers.—Peabody and Miller. Strength, construction, and wear and tear of boilers. (1)

French.—Whitney's Practical French Grammar. Super's Reader. (2) Or *German.*—Joynes-Meissner's Grammar. Buchheim's Reader. (2)

English.—English literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. Lectures and recitations. (3) Laboratory. (1)

Steam Engine.—Holmes' Steam Engine. (4)

French.—Grammar and Reader (continued). (2) Or *German.*—Grammar and Reader (continued). Short stories by different modern authors. (2)

English.—English prose literature. (2) Essays.

SUMMER SCHOOL.

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern-making, moulding, forging, fitting, and finishing.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Differential equations. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on experimental tests. (4)

Mechanics of Machinery.—Herrmann-Smith. Graphical Statics of Mechanisms. (2)

Electro-technology.—Theory of magnetism. Direct and alternating currents. Dynamos and motors. Electric light and power. (5)

French.—Advanced grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2) Or *German.*—Advanced grammar. Short stories by different modern authors. (2)

Economics.—Elementary economics. (1)
English.—English and American Orators. (1)

SECOND TERM.

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Machine Design.—Calculations and working drawings for a high-speed steam engine. (4)

Machinery of Transmission.—Weisbach-Herrmann. (3)

Dynamo Laboratory.—Testing out. Insulation and conductivity tests. Dynamo and motor tests, and location of faults. (1)

French.—Advanced grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2) Or *German.*—Advanced grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Dictation. (2)

Economics.—Economic problems. (1)
English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Thermodynamics.—General principles; application to steam engines and air compressors. (3)

Kinematics of Machinery.—Nature and equivalence of mechanisms. Diagrams of the changes of position, speed, and acceleration in mechanisms. Valve and link motions. (5)

Graphical Statics.—Graphical analysis of roof trusses and girders. (2)

Machine Design.—Calculations and working drawings for hoisting, pumping, and metal-working machinery. (4)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Mechanics of Machinery.—Weisbach-Herrmann. Hoisting machinery, accumulators, cranes, and locomotives. (2)

SECOND TERM.

Mechanics of Machinery.—Weisbach-Herrmann. Pumps, pumping engines, blowing engines, compressors, and fans. (4)

Machine Design—Original designs. (5)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

THE COURSES IN MINING ENGINEERING.

These courses aim to fit the student for practical work in either of the branches of mining, metallurgy, metallurgical chemistry, or geology. On account of the great number and scope of the studies necessary to the attainment of the degree of Engineer of Mines (E.M.), which includes that of Metallurgist, five years are required. At the end of the fourth year the student will have completed a course similar to that leading to the scientific degree in other institutions, and will receive the degree of Bachelor of Science (B.S.) in either mining or metallurgy. The following program of subjects and studies shows the requirements for the degree of Engineer of Mines.

Modern Languages.—Although the option of studying French or German lies with the student, it may be well to note that the current literature of the subjects taught in these courses is more abundant in the latter language.

Drawing and Construction.—The course in mechanical drawing begins with tracings of good examples of machine drawings; then follow the interpretation of such drawings, and the making of general views of machines from detailed sketches, exercises in projection drawing

from the same, and the proportioning of simple tools and machines.

A brief course in descriptive geometry is given, in which the student is grounded in the fundamental principles of the subject. The simpler applications are given in the form of problems, and a number of practical examples are worked out in the drawing room.

Under the charge of an instructor, the students make visits of inspection to mines and metallurgical works, during which they examine and make sketches of portions of the plant, and take notes concerning it. From these sketches and notes they subsequently make working drawings accompanied by written memoirs explanatory of the construction and operation of the plant.

In a later portion of the course the students are required to make original designs for mining and metallurgical plant under given conditions, involving exercise in the adaptation and proportioning of structures, machinery, and apparatus to suit the conditions given.

The field work in mining and geological surveying is followed by map construction from field notes.

CHEMISTRY.—The course in theoretical and applied chemistry extends over three years and includes work in wet and dry assaying of all the important ores and metallurgical products met with in actual practice, combined with the working of stoichiometric problems and the study of chemical philosophy. The practical work is that required for a metallurgical chemist or assayer.

With moderate care the expenses in this department need not exceed $120.

MINERALOGY.—This subject is divided into two courses. In the first course, after a short exposition of the laws of crystallography and a description of crystalline forms, practical exercises are held in the determination of simple and complex crystals, in which the student is taught to identify the various crystalline forms observed in minerals by the aid of models and of actual crystals, and with the use of

the application goniometer. The second course includes the subjects of physical, descriptive, and determinative mineralogy. As in the first course, the greater part of the time is devoted to practical exercises, which, in this course, have for their object the determination of minerals. Each student is thus enabled to become familiar with the more common minerals by the actual handling of several hundred specimens, with the facility of making such tests as will not injure them. The presence of one or more instructors during each exercise permits the student to make frequent reports of his determinations, and to receive much instruction as to the characteristics of the minerals. The knowledge thus acquired can be supplemented by visits to the museum.

The course in blowpipe analysis may be considered as auxiliary to the practical exercises in determinative mineralogy. In the latter the student is urged to rely chiefly on physical tests; in the former he is required to determine minerals by the aid of the blowpipe.

The mineralogical laboratory offers facilities for an advanced course in crystallography and in physical and microscopic mineralogy to a few students who may receive permission to pursue such a course.

Geology.—This subject is studied with special reference to the needs of the mining engineer. Within a radius of twenty miles the student meets and becomes acquainted with the rocks of the archæan, the palæozoic, and the mesozoic formations, and makes geological maps from his own field notes, paying attention to the lithological characters of the formations, as they are mainly non-fossiliferous south of the Blue Ridge. An extended practical course in lithology familiarizes the student with the rocks of importance to the mining engineer and enables him to determine them by sight. There are over 2,500 specimens in the collections, embracing nearly all the known species. The course in historic geology is illustrated by a cabinet of typical specimens. The course in economic geology supplements the above work by familiarizing the student with

the geological horizon of all the valuable constituents of the earth's crust and the theories of their formation. As Bethlehem is near the center of the "extra-morainic" drift, exceptional facilities are afforded for the study of pleistocene geology in Eastern Pennsylvania.

Applied Mechanics.—This embraces hydraulics, a study of the steam engine, and the mechanics of machines employed in mining and metallurgy.

Surveying.—A course extending over five terms offers practice in land, mine, and geological surveying, leveling, topography, triangulation, railroad reconnaissance and location, and the use of the solar transit. It also includes practical work in drawing and map construction.

Candidates for the degree of B. S. in Mining will be required to take the course of topographical surveying in the Summer School at the end of the Sophomore year. Candidates for the degree of E. M., who have taken the degree of B. S. in Metallurgy, will be required to take the course of topographical surveying in the Summer School at the end of the Senior year. Students in Metallurgy may fulfill this requirement in anticipation by taking this course in the Summer School at the end of either the Sophomore or the Junior year.

Metallurgy.—There are two courses, making, together, about one hundred and forty lectures on this subject, which extend throughout a year. In these the chief object kept in view is a clear presentation of the principles involved in the various metallurgical processes, looked upon as the application to practice of the laws of chemistry, physics, and mechanics. This is followed, in the case of each process, by a description of the more important examples of the plant and of the methods of conducting the process, and by indications concerning its economic features. In order to ensure the student's understanding the fundamental principles of metallurgy, and his becoming so familiar with them as to be able readily to apply them, he is required to solve a series of problems in which these

principles are involved. Many of the problems are such as are likely to present themselves to the metallurgist in his current practice.

The metallurgical laboratory affords opportunity for special investigations in subjects connected with metallurgy to such advanced students as are competent to conduct them.

MINING.—This subject is covered by three courses. The first begins with the application of economic geology to the needs of the engineer, so that he can study and value mining properties, locate appropriately the necessary plant, and calculate the cost of production. It includes the discussion of faults and the means of finding faulted bodies, with practical problems. The subjects of blasting, timbering, and winning deposits are applied to actual cases, as tunnel-driving, etc., and problems from practical data are solved by the students. The second course covers the subjects of underground and surface haulage; loading, unloading, and stocking ores; pumping, ventilation, hygiene, and mining law. A series of problems is given in each of these subjects to cover cases that meet the engineer in ordinary practice. The third course treats of the mechanical preparation of ores by the wet, dry, or magnetic methods, and especially of the preparation of anthracite coal.

The location of the University in the vicinity of the iron works of the Lehigh Valley, and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for the manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc and Iron Co. The facilities for the practical study of mining and economic geology are not excelled by those of any other institution in the country. The zinc mines at Friedensville, the paint ores of the Marcellus formation, and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the semi-bituminous and anthracite coal fields, the block and fossil iron ores of the

Clinton measures, the iron mines at Cornwall, Pennsylvania, and the iron and zinc mines of New Jersey, together affording examples of nearly all the methods of winning and dressing valuable deposits. Numerous visits of inspection are made in connection with the work of the course, to familiarize the student with metallurgical and mining processes and afford data for practical examples and projects.

THE COURSE IN METALLURGY.

This course is arranged so that the subjects which prepare the student for practice in the field of metallurgy shall be completed at the end of four years, when the graduate will receive the degree of Bachelor of Science in Metallurgy (B.S.). By remaining a year longer, and taking the subjects laid down for the graduate year, the graduate in the course may obtain the degree of Engineer of Mines (E. M.).

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Drawing.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., accompanying the study of descriptive geometry and illustrated from examples of mining and metallurgical plant. (4)

Physics—Mechanics. (3)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem

Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SUMMER SCHOOL.

Visits of Inspection.—Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Drawing.—Flat tinting with water colors. Graphical problems illustrating the direction and extent of throw in faults. Examination and sketching of metallurgical plant in the vicinity. General views and working drawings of the plant examined, accompanied by written descriptions of its construction and operation. (4)

Land Surveying.—Theory and use of level and transit. Field practice and map-drawing. (2)

English.—English literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. (3)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Stoichiometry. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Chemistry.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium Dichromate (Cr_2O_3).
3. Copper ore (Cu).
4. Zinc ore (Zn): by both gravimetric and volumetric methods.
5. Lead ore (Pb,S).
6. Silver coin (Au, Ag, Pb, Zn).

Chemical Philosophy.—Tilden. Chemical calculations. Thorpe and Tate. (3).

Assaying.—Including the assay by the dry methods of gold, silver, antimony, lead, iron, and tin ores, coal, and gold and silver bullion. Laboratory work. Ricketts. (3)

Economics.—Elementary economics. (1)

English.—English and American Orators. (1)

SECOND TERM.

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Fresenius' Quantitative Analysis. Laboratory work. (3) The following analyses are executed by the student:

7. Copper alloys (Cu, Sn, Zn, Pb).
8. Spiegeleisen (Mn): by both gravimetric and volumetric methods.
9. Iron ore (complete analysis).
10. Limestone (complete analysis).
11. Coal (volatile matter, fixed carbon, ash, H_2O, S, P).

Steam Engine.—Holmes's Steam Engine. (4)

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Blow-Pipe Analysis.—Practice. (1)

Lithology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Chemistry.—Fresenius' Quantitative Analysis. Laboratory work. (4) The following analyses are executed by the student:

12. Slag (complete analysis).
13. Pig iron (complete analysis).
14. Carbon in steel (volumetric).
15. Nickel ore (Ni, Co).
16. Gas analysis.

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Ore Dressing.—Mechanical preparation of ores. Coal washing. Lectures. (3)

Drawing.—Designing of furnaces and other metallurgical plant. (2)

Mechanics of Machinery.—Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Geology.—General geological definitions and principles. Dynamic and historic geology. Dana. Lectures. (4)

Measurement of Power. (1)

Christian Evidences.—Lectures. (1)
Preparation of Thesis.

SUMMER SCHOOL.*

Topographic Surveying.—Field work with transit and stadia and with plane table. Topographic maps.

GRADUATE YEAR.

FIRST TERM.

Mining.—Prospecting. Economic geology. Boring. Valuation of property. Timbering and walling. Support of excavations. Tunneling. Systems of mining. Lectures. (4)

Mechanics of Machinery.—Herrmann-Smith. Graphical Statics of Mechanisms. (2)

Drawing.—General views of mining plant and detailed sketches. (5)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (3)

Mine Surveying.—Theory and problems, with maps drawn from actual surveys. (2)

SECOND TERM.

Projects.—In mining. Designing of mining plant. (4)

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Geological Surveying.—Theory, practice, and map drawing. (2)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Preparation of Thesis.

THE COURSE IN MINING.

This course is arranged so that the subjects included in the practice of mining and ore dressing will be covered in

*For candidates for the degree of E. M.

four years, when the graduate will receive the degree of Bachelor of Science in Mining (B.S.), and by an additional year of post-graduate work can obtain that of Engineer of Mines (E.M.).

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing.—Tracings and blue prints. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., illustrated from examples of mining and metallurgical plant. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Drawing.—Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Graphical problems illustrating the direction and extent of throw in faults. (2)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Land Surveying.—Theory and use of level and transit. Field practice and map drawing. (2)

English.—English literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. (3)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice: Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

English.—English prose literature. (2) Essays.

SUMMER SCHOOL.

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographic maps.

JUNIOR CLASS.

FIRST TERM.

Mining.—Prospecting. Economic geology. Boring. Valuation of property. Timbering and walling. Support of excavations. Tunneling. Systems of mining. Lectures. (4)

Lithology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Assaying.—Including the assay by the dry method of gold, silver, antimony, lead, iron, and tin ores, coal, gold and silver bullion, and rich lead. Ricketts. (3)

Economics.—Elementary course. (1)

English.—English and American Orators. (1)

SECOND TERM.

Geology.—General geological definitions and principles. Dynamic and historic geology. Lectures. Dana. (4)

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Ore Dressing.—Mechanical preparation of ores. Coal washing. (3)

Steam Engine.—Holmes' Steam Engine. (4)

Economics.—Economic problems. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Drawing.—General views of mining plant and detailed sketches. (5)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (3)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Mechanics of Machinery.—Herrmann-Smith. The Graphical Statics of Mechanisms. (2)

Mine Surveying.—Theory and problems, with maps drawn from actual surveys. (2)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Projects.—In mining. Designing of mining plant. (4)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Mechanics of Machinery,—Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Geological Surveying.—Theory, practice, and map drawing. (2)

Measurement of Power—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

GRADUATE YEAR.

FIRST TERM.

Chemical Philosophy.—Tilden. Chemical calculations. Thorpe and Tate. (3)

Blowpipe Analysis.—Practice. (1)

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Drawing.—Metallurgical construction. (4)

Chemistry.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium Dichromate (Cr_2O_3).
3. Copper ore (Cu).
4. Zinc ore (Zn): by both gravimetric and volumetric methods.
5. Lead ore (Pb,S).
6. Silver coin (Au, Ag, Pb, Zn).
7. Copper alloys (Cu, Sn, Zn, Pb).
8. Spiegeleisen (Mn): by both gravimetric and volumetric methods.

SECOND TERM.

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Drawing.—Metallurgical design. (2)

Chemistry.—Fresenius' Quantitative Analysis. Laboratory work. (6) The following analyses are executed by the student:

9. Iron ore (complete analysis).
10. Limestone (complete analysis).

11. Coal (volatile matter, fixed carbon, ash, H_2O,S,P).
12. Slag (complete analysis).
13. Pig iron (complete analysis).
14. Carbon in steel (volumetric).
15. Nickel ore (Ni, Co).
16. Gas analysis.

Thesis.

THE COURSE IN ELECTRICAL ENGINEERING.

The object of this course is to provide instruction in the elementary sciences, mathematics, and electrotechnology, supplemented by the study of the strength of materials, the mechanics of machinery, machine design, thermodynamics, and hydraulics.

The elementary course in Mechanics, Heat, Electricity and Magnetism, Light, and Sound begins with the second term of the Freshman year and extends to the end of the Sophomore year. This work is common to all the technical courses.

Students in Electrical Engineering pursue the mathematical theory of electricity and magnetism during the first term of the Junior year and an extended course in the electrical laboratory throughout the Junior year. The electrotechnical work begins with the second term of the Junior year, when the student takes up the technical study of telegraphs and telephones and begins the elementary theory of dynamos and motors and the theory of alternating currents. The Senior year is devoted to electrical designing, the theory of alternating currents, electric lighting, power transmission, dynamo laboratory and heavy electrical testing, electro-metallurgy, and thesis work.

A laboratory fee is charged to students to cover the cost of laboratory supplies. Students taking one laboratory exercise per week are required to pay $3.50 per term; students taking two laboratory exercises per week are required to pay $5.00 per term; and students taking three laboratory exercises per week are required to pay $6.50 per term.

The student who completes all the studies of this course will receive the degree of Electrical Engineer (E E.).

For the benefit of graduates in Electrical Engineering who desire to study the advanced portions of electrical science, instruction is offered in the mathematical theory of electricity and magnetism, in the advanced theory of alternating currents, and in mathematical physics in general.

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing and Machine Design.—Tracings and blue prints. Shetches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halèvy: L'abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SUMMER SCHOOL.

Visits of Inspection.—Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers, and connecting rods. (3)

Boilers.—Peabody and Miller. Strength, construction, and wear and tear of boilers. (1)

French.—Whitney's Practical Grammar. Super's Reader. (2) Or *German.*—Joynes-Meissner's Advanced Grammar. Buchheim's Reader. (2)

English.—English literature. (2) Essays.

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Steam Engine.—Holmes' Steam Engine. (4)

Physics.—Electricity and magnetism, light, and sound. Lectures. (3) Physical laboratory. (1)

French.—Grammar and reader (continued). (2) Or *German.*—Grammar and reader (continued). Short stories by different modern authors. (2)

English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Differential equations. (2)

Electricity.—Advanced course in the theory of electricity and magnetism. (4)

Electrical Laboratory.—Course in electrical measurements. (3)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Reports on the testing of materials. (4)

Surveying.—Theory and use of instruments. Land surveying and leveling. Location of electric railways. (2)

French.—Grammar. George Sand : La Mare au Diable. Dumas : Pauline. (2) Or *German.*—Advanced grammar. Short stories by different modern authors. (2)

Economics.—Elementary economics. (1)

English.—English and American Orators. (1)

SECOND TERM.

Dynamo-electric Machinery.—Direct-current generators and motors. Text-book : Jackson's Electro-Magnetism and the Construction of Dynamos. (3)

Electrical Designing. (1)

Alternating Currents.—The analytical and graphical treatment of alternating currents. (2)

Electrical Laboratory.—Continuation of course in electrical measurements. (2)

Telegraphs and Telephones.—Lectures. (3)

Chemistry.—Lectures and laboratory practice. Douglass and Prescott's Qualitative Analysis. (3)

French.—Advanced grammar. Short stories by François Coppée and Guy de Maupassant. Vigny : Le Cachet Rouge. Dictation. (2) Or *German.*—Advanced grammar. Beresford-Webb : German Historical Reading Book. Freytag : Aus dem Staate Friedrichs des Grossen. Dictation. (2)

Economic.—Economic problems. (1)

English.—British essayists. (1)

Christian Evidences. (1)

SENIOR CLASS.

FIRST TERM.

Dynamo-electric Machinery.—Alternators and transformers. (2)

Electrical Designing.—Lectures. (2)

Alternating Currents. (2)

Electric Lighting and Station Visits. (2)

Dynamo Laboratory. (3).

Measurement of Power.—Indicating of steam engines and dynamometer experiments. (1)

Mechanics of Machinery.—Herrmann-Smith. The Graphical Statics of Mechanisms. (2)

Thermodynamics. (3)

Four lectures on recent advances in Electrical Engineering.

SECOND TERM.

Alternating Currents. (2)

Dynamo-electric Machinery.—Polyphase apparatus. (2)

Electrical Designing. (2)

Dynamo Laboratory. (3)

Electro-metallurgy.—Lectures. (1)

Electric Power and Station Visits. (2)

Hydraulics.—Flow of water through orifices, pipes, and channels. Hydraulic motors. (3)

Preparation of Thesis.

Four lectures on recent advances in Electrical Engineering.

THE COURSE IN CHEMISTRY.

This course of study is designed to prepare students for the profession of the chemist, in connection with metallurgical establishments, sugar refineries, gas works, superphosphate works, electrical machinery manufactories, mining companies, etc., and the general consulting and analytical work of the professional chemist. It is also well adapted to the preparation of teachers of chemistry and as a course preliminary to the study of medicine. It is eminently practical, the student's time being largely occupied by practical work in the large, well equipped and well ventilated chemical laboratories, which were completed in 1885 and constitute the best constructed building for this purpose in this country. The museum of chemistry contains large collections of specimens for illustrating the lectures on theoretical and applied chemistry.

THEORETICAL CHEMISTRY.—Instruction in this subject

begins with lectures twice a week in the first term of the Freshman year. These lectures are fully illustrated by experiments, colored diagrams, working drawings and lantern pictures, and specimens from the museum. They include a general introduction to theoretical chemistry and a description of the non-metallic and metallic elements and their compounds, the general subject of inorganic chemistry. The students are required to take notes of the lectures and to pass a written examination at the end of the term. There is also a course of experimental chemistry in the laboratory; six hours per week are required.

In the second term of this year stoichiometry and chemical problems and reactions are taught by recitations twice each week.

The study of theoretical chemistry is continued throughout the Sophomore year by recitations three times a week from Tilden's Chemical Philosophy, Thorpe and Tate's Chemical Problems, and Remsen's Advanced Chemistry; in the first term of the Junior year by a course of lectures and recitations on theoretical organic chemistry four times a week. These lectures are illustrated by experiments and by specimens from the museum of chemistry.

Written examinations are held at the close of each of the above courses.

Analytical Chemistry.—Qualitative analysis is taught in the second term of the Freshman year by lectures, recitations, and practical work in the qualitative laboratory, fifteen hours of practical work per week being required. This laboratory is a large, well ventilated and well lighted room, supplied with convenient working tables, vacuum filtration, hoods for noxious vapors, steam baths, gas and washing appliances, and a commodious room for hydrosulphuric acid. Distilled water is delivered by faucet in this room and the other large laboratories. At the close of the term a practical examination is held in this subject.

After completing this course, quantitative analysis is pursued throughout the Sophomore and the first term of the Junior years. This subject is taught by lectures, reci-

tations, and practical work in the quantitative laboratory, which is equipped like the qualitative laboratory, but is supplied in addition with apparatus for drying precipitates and residues, rooms for the chemical balances, for combustions, and for a reference library.

Fifteen hours per week of laboratory work are required.

The course consists in gravimetric and volumetric analyses, as applied to the substances given in the lists farther on, accuracy being required in the determination of each constituent.

At the close of each term written examinations are held upon the theory and practice of quantitative analysis.

Gas Analysis is taught by lectures and laboratory practice in the gas laboratory. This laboratory is supplied with full and complete apparatus for gas analysis, according to Bunsen's processes, as well as apparatus for some of the more rapid methods. Mixtures of gases are required to be analyzed by the students, within certain limits of error, and a written examination, on the theory and practice, is held at the close of the course.

Assaying.—The assaying of ores by furnace assay, together with gold and silver bullion analysis, by processes practiced in the United States Mint, is taught by lectures and practical work in the first term of the Senior year, nine hours of practical work per week being required. The course includes the assaying of ores of lead, tin, antimony, gold, silver, and iron, coal, and gold and silver bullion.

The assaying laboratory is supplied with large working tables, twenty-nine crucible and two iron furnaces, and eight muffle furnaces, with adjoining rooms for balances, and gold and silver bullion analysis.

A certain accuracy of results and a written examination as regards theory and practice are required.

Organic Chemistry.—The practical work in this subject is performed in the second term of the Junior year, eighteen hours per week being required, with conferences and recitations each week. The laboratory for this work

is equipped similarly to the quantitative laboratory, in addition being supplied with steam, cold water and air blast upon the working tables, and a full supply of apparatus for the various determinations and experiments, including combustion furnaces, furnaces for heating sealed tubes, mercury pump, Hoffman's, Dumas' and Meyer's apparatus for vapor densities, nitrometers, chemical balances, etc.

The course consists of determinations of specific gravities, melting points, boiling points, vapor densities; chlorine, bromine, iodine, and sulphur of organic substances.

Combustion analysis, nitrogen determination, fractional distillation, and the preparation of fifty pure organic compounds and a number of analyses are included.

Industrial Chemistry.—A course of lectures is delivered upon this subject in the second term of the Senior year, illustrated by experiments, diagrams, lantern pictures, and specimens from the museum of chemistry. The working laboratories for this subject contain an apparatus for making illuminating gas, an alcohol still, worm and doubler, and a complete working model of a sugar refinery, including filters, vacuum pan, and centrifugal. There is also apparatus for use in the manufacture of chemicals, for dyeing, calico printing, and bleaching. In connection with these laboratories is a room containing a photometer and apparatus for determining the sulphur, ammonia, and specific gravity of illuminating gas; also a laboratory for the testing of alcoholic liquors, sugar, molasses, bone black, soap, petroleum, paints, dyes, superphosphates, tallow, illuminating and lubricating oils, rubber, explosives, paints, asphalts, and other commercial products, with the necessary technical apparatus. The students make practical experiments in this direction, and, with an instructor, visit various industrial establishments in this neighborhood and in and around New York City. Fifteen hours of laboratory work are required each week throughout the Senior year.

TOXICOLOGY.—A course of lectures on this subject is given in the first term of the Junior year, illustrated by experiments and by the large collection of specimens of poisons from the museum of chemistry. This is supplemented by a short course of laboratory work on some of the common poisons.

SANITARY CHEMISTRY.—During the second term of the Senior year attention is given to the qualitative and quantitative examination of air, water, food, disinfectants, baking-powders, flour, bread, tea, coffee, cocoa, spices, milk, butter, lard, beer, and other subjects connected with this branch of the science. Special apparatus is provided for this work, as recommended by the best authorities on the subject.

PHOTOGRAPHIC CHEMISTRY.—A well equipped photographic laboratory and dark rooms are provided, in which the students of the chemical course receive practical instruction.

PHYSIOLOGICAL CHEMISTRY.—The examination of urine, blood, organic and inorganic poisons, etc., receives a proper amount of attention.

The course also includes instruction in physics, mineralogy, blowpipe analysis, metallurgy, and geology, which are of great value to the chemist.

MICROSCOPY.—Instruction in the use of the microscope is given in the first term of the Senior year, six hours of laboratory work each week being required.

In the Senior year the student is required to prepare a thesis on some subject, selected by the Professor of Chemistry, involving practical work in the laboratory in addition to the literary labor, each graduate thus making a contribution to the progress of the science, as a preliminary to the reception of his degree.

The graduate of this course receives the degree of Analytical Chemist (A.C.).

Students not candidates for a degree are admitted to

special courses in chemistry, of which they will receive certificates.

The laboratories are under the immediate charge of the Professor and Instructors of Chemistry and are open to the students from 8 o'clock A. M. to 6 o'clock P. M., including Saturdays. Students are at liberty to work in the laboratories beyond the required hours as their time may permit. Students are charged for materials and apparatus consumed; with moderate care this expense need not exceed $50 per year.

FRESHMAN CLASS.

FIRST TERM.

See page 51.

SECOND TERM.

Mathematics.—Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Physics.—Mechanics. (3)

Stoichiometry. (2)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. Conversation class in both languages optional throughout the year.

English.—History of the English language. (2) Essays.

SOPHOMORE CLASS.

FIRST TERM.

Chemical Philosophy.—Tilden. Chemical problems. Thorpe and Tate. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium dichromate (Cr_2O_3).
3. Barium chloride (Ba, Cl, H_2O).
4. Magnesium sulphate (MgO, SO_3, H_2O).
5. Disodium hydrogen phosphate (P_2O_5).
6. Rochelle salt (K_2O, Na_2O).
7. Volumetric determination of chlorine.
8. Acidimetry (HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$).
9. Alkalimetry (KOH, NaOH, NH_4OH, soda ash, pearl ash).
10. Chlorimetry (bleaching powders).
11. Copper ore (Cu).
12. Zinc ore (Zn). By both gravimetric and volumetric methods.

Quantitative Analysis.—Conference. (1).

Physics.—Heat, electricity and magnetism. Lectures, with study of text-book. (3) Mechanics, heat. Laboratory. (1)

English.—English literature. (2) Essays.

SECOND TERM.

Physics.—Electricity and magnetism, light, sound. Lectures and recitations. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (6)

The following analyses are executed by the student:

13. Lead ore (Pb, S).
14. Silver coin (Au, Pb, Ag, Cu).
15. Spiegeleisen (Mn). By both gravimetric and volumetric methods.
16. Copper alloys (complete analysis).
17. Ilmenite (TiO_2).
18. Iron ore (complete analysis).
19. Limestone (complete analysis).
20. Coal (volatile matter, fixed carbon, ash, H_2O, S, P).
21. Slag (complete analysis).

Quantitative Analysis.—Conference. (1)
Chemistry.—Remsen. Advanced course. (3)
English.—English prose literature. (2) Essays.

JUNIOR CLASS.

FIRST TERM.

Toxicology.—Lectures. (2)
Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)
The following analyses are executed by the student:
22. Guano (NH_3, P_2O_5,H_2O).
23. Clay (complete analysis),
24. Manganese ore (MnO_2).
25. Mineral water (complete analysis).
26. Pig iron (complete analysis).
27. Nickel ore (Ni, Co).
28. Carbon in steel (colorimetric).
29. Gas analysis.
Quantitative Analysis.—Conference. (1)
Organic Chemistry.—Lectures and recitations. (4)
Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)
Economics.—Elementary economics. (1)
English.—English and American Orators. (1)

SECOND TERM.

Organic Chemistry.—Laboratory. (6)
Organic Chemistry.—Conference. (1)
Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)
Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. E. S. Dana. (3)
Blowpipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)
English.—British essayists. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Assaying.—Including the assay by the dry method of gold, silver, antimony, lead, iron, and tin ores, coal, gold and silver bullion, and rich lead. Ricketts. (3)

Industrial Chemistry.—Laboratory. (3)

Geology.—Williams' Lithology, with practical exercises in determining rocks. (3)

Microscopy.—Laboratory. (2)

Blowpipe Analysis.—Practice. (1)

Preparation of Thesis.

SECOND TERM.

Industrial Chemistry.—Lectures. (3)

Industrial Analysis.—Laboratory. (3)

Industrial Analysis.—Conference. (1)

Agricultural Chemistry.—Laboratory. (1)

Sanitary Chemistry.—Laboratory. (1)

Geology.—Historic and dynamic geology. Lectures. LeConte. (3)

Christian Evidences.—Lectures. (1)

Preparation of Thesis. (4)

PHYSICAL CULTURE.

The Gymnasium is open morning, afternoon, and evening; in all, 45 hours a week. Exercise in it is required of all students who are fitted to take it. Class drill with the Instructor and individual exercise are prescribed.

GRADUATING THESES.

Every student is required to present a thesis upon some topic connected with the course from which he is to graduate, as a necessary portion of the exercises for his final examination for a diploma. These theses are accompanied by drawings and diagrams, when the subjects need such illustration. The originals are kept by the University, as a

part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the Secretary of the Board of Trustees and by the Faculty of the University. For all partial courses a certificate is given, signed by the Secretary of the Faculty, and showing what the student has accomplished.

GRADUATE STUDENTS.

Graduate students wishing to remain a year or more and pursue a course of study as candidates for another Degree may do so with the sanction of the Faculty. Those wishing to take *special* courses of study will be afforded every facility for so doing.

GRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts any candidate, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue, for at least one year at this University, or two years elsewhere, a course of liberal study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same, and present a satisfactory Thesis.

M. S.

The Faculty will recommend for the Degree of Master of Science any candidate, otherwise properly qualified, who, after taking at this University any Degree in the School of Technology, shall pursue, for at least one year at this University, a course of study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same and

present a satisfactory Thesis. Graduates of the Latin-Scientific Course, or of that of Science and Letters, are permitted to study *in absentia* for the degree of M.S., subject to the same restrictions as those prescribed for candidates for the degree of M.A.

The Theses presented by candidates for Graduate Degrees are retained by the University.

Applicants for either of these degrees will be required to complete the prescribed work within the allotted time. Special action of the Faculty is required for any extension of time.

THE UNIVERSITY LIBRARY.

The Library building was erected by the Founder of the University in 1877, at a cost of $100,000, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than $20,000 were contributed by her family and friends as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the center is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for one hundred and sixty thousand volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Ninety-seven thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about two hundred and fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A.M. until 10 P.M., and on Sundays for the students and others connected with the University from 1:30 P.M. until 9:30 P.M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.

IV. The University Professors and Instructors, only, are allowed to take books from the Library Building.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pen and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations will be denied the privileges of the Library.

X. Any person who defaces, in any way, any book magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

THE ECKLEY B. COXE MEMORIAL LIBRARY.

In memory of the Honorable Eckley B. Coxe, who was for many years a Trustee of the University and who was profoundly interested in its welfare, Mrs. Coxe has pre-

sented to the University his technical library, consisting of 7727 volumes, together with 3429 pamphlets. As the working library of a man who was remarkable as well for the breadth of his culture as for the extent and thoroughness of his acquaintance with the whole field of applied science, this addition to the resources of the University possesses the greatest value for all professional students.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an astronomical observatory was erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an equatorial telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior sidereal clock, by Wm. Bond & Sons; a zenith telescope, by Blunt, and a field transit, by Stackpole. There is also a prismatic sextant, by Pistor & Martins.

Students in practical astronomy receive instruction in the use of the instruments and in actual observation.

The land upon which the Observatory stands, consisting of seven acres adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

THE UNIVERSITY MUSEUM.

In addition to the large collection illustrating all branches of Industrial Chemistry, the Museum includes collections in Metallurgy, Geology, Zoölogy, and Archæology.

The Metallurgical Cabinet already includes specimens illustrating the various processes for obtaining the more common metals.

The Zoölogical Cabinet includes the Werner collection of nearly all the types of American birds with their nests and eggs, and the Packer collection of recent shells.

The Geological Cabinet numbers over ten thousand specimens and includes the Palæontological, Mineralogical, Petrographic, and Economic collections. The first contains good specimens of nearly all the common genera. The Mineralogical division includes the Keim and Rœpper collections—the latter being especially complete and valuable from a crystallographic standpoint. The Petrographic division numbers several thousand specimens and, besides including numerous varieties of nearly all the rocks of the globe, contains a duplicate set from the collection of the Second Geological Survey of this State. The Economic division was formed and given by Dr. James P. Kimball, ex-Director of the Mint, and formerly Professor of Economic Geology.

The Cummings Archæological Cabinet numbers three thousand specimens and includes Dr. Stubbs's collection of Indian relics, weapons, and utensils.

SUMMER SCHOOL IN SURVEYING.

The regular course in topographic surveying for students in civil and mining engineering is given in the summer vacation between the Sophomore and Junior years. An optional course in Land Surveying is also offered at the same time, for which a fee of $15 is charged. These courses are open to a limited number of persons, not students at the University, who are qualified to pursue them, upon payment of the same fee. Application should be made to the professor of civil engineering before June 1st.

UNIVERSITY LECTURES.

From time to time during the University year, distinguished members of the various professions are invited to lecture before the student body upon those special subjects to which they have given particular attention and upon which they are authorities.

CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of botanical and zoölogical specimens belonging to the Society are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

THE ENGINEERING SOCIETY.

This Society was organized in 1873, and admits, by election, students in the Junior and Senior Classes. Its meetings are held fortnightly. At these, papers relating to engineering subjects are read and discussed. From 1885 to 1890 it issued quarterly five volumes of "The Journal of the Engineering Society," containing contributions by the members, alumni, and others. Many of the papers read before this society from 1890 to 1893 were published in "The Lehigh Quarterly."

The society includes in its membership students from all the engineering courses of the University. In addition to the general organization of the society, with fortnightly meetings as above stated, the representatives of the Civil and Mechanical Engineering courses form subordinate sections, with separate organizations and stated meetings, for the discussion of subjects of particular interest.

THE ELECTRICAL ENGINEERING SOCIETY

was organized in November, 1887. Its object is to supplement the regular work of the department by the study and discussion of electrical subjects.

THE AGORA AND THE FORUM

are literary and debating societies which meet semi-monthly. The Agora is the older society and was formerly restricted in its membership to students in the School of General Literature, but in 1893 it was thrown open to all students; and shortly afterward the Forum was organized. These societies have proved of great advantage to their members in the development of concise and logical thinking, in the promotion of ease before an audience, and in the acquirement of experience in parliamentary methods. Through these societies the University is represented in the Pennsylvania Intercollegiate Oratorical Union, and at the annual contest of the Union held at Allentown, March, 1897, the first prize was won by Lehigh's representative, Basil George Kodjbanoff. An annual contest in debate is held with representatives of the literary societies of Lafayette College. The societies have justified their existence by the great increase in the amount of attention given, not only to training in oratory and debate, but also to those subjects of the day which are constantly discussed at their meetings.

THE MATHEMATICAL CLUB.

This club was organized in February, 1895. Its members are students in the Junior and Senior classes. Its object is to continue the study of higher mathematics after having completed the mathematical course of the University. It holds frequent meetings at which papers are read and discussed by its members.

THE LEHIGH UNIVERSITY CHRISTIAN ASSOCIATION.

This is a voluntary organization of the students for the promotion of the religious, moral, and social life of the University. It was organized April 18, 1890, and on October 11, 1890, united itself with the Intercollegiate Young Men's Christian Association. The movement is

distinctly for and by students, all the officers being chosen from the student-body. Those connected with Evangelical churches of whatever creed are eligible to *active membership; associate membership* may be claimed by men of good moral standing who are not members of churches. The association is continually growing and is extending a marked influence for good among the men.

FOUNDER'S DAY.

On the second Thursday of October of each year, Commemorative Exercises are held in honor of the Founder of the University. On Thursday, October 14, 1897, the eighteenth Founder's Day was celebrated. An address was delivered by President James M. Taylor, D.D., LL.D., of Vassar College. His subject was "The Hope of the Republic."

UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rev. Thomas B. Angell, D.D., of Harrisburg, was the preacher on Sunday, June 13, 1897, in the Packer Memorial Church.

THESES.

Theses on the following subjects were prepared by candidates for degrees in 1897:

FOR THE DEGREE OF MASTER OF SCIENCE.

JOSEPH BARRELL, B.S., E.M., New Providence, N. J.
The Geological History of the Archean Highlands of New Jersey, including their Extension in New York and Pennsylvania.

FOR THE DEGREE OF ENGINEER OF MINES.

EDWARD WILLIAMSON MILLER, B.S., Bethlehem.
Magnetic Separation, with respect to the Wetherill Process.

JOHN AUGUSTUS THOMSON, B.S., Summit Point, W. Va.
A Discussion of the Pennsylvania Mining Code.

FOR THE DEGREE OF CIVIL ENGINEER.

CHARLES MARSHALL BARTON, Pikesville, Md.
Design for a Foot Suspension Bridge over the Lehigh River at Bethlehem.

SINCLAIR WIGGINS CHILES, Sims City, Fla.
Design for a Highway Cantilever Bridge over the Lehigh River at Bethlehem.

BARTON OLMSTED CURTIS, Monona, Iowa.
Design for a Water Filter Plant for South Bethlehem.

CLIFFORD GEORGE DUNNELLS, Pittsburg.
Design for a Steel Mill Building.

WILLIAM THOMAS HANLY, Philadelphia.
The Foundations and Retaining Walls of the New Philadelphia Subway.

HENRY HARRISON JONES, Reading.
Design for a Plate Girder Bridge to replace the Bridge over the Canal, on Main Street, Bethlehem.

ESTEBAN A. MERCENARIO, Puebla, Mexico.
Design for a Water Supply System for the Port of Acapulco, Mexico.

THADDEUS MERRIMAN, South Bethlehem.
Observations and Formulas for the Magnetic Declination at South Bethlehem.

FRANK DOUGLASS MOUNT, Manasquan, N. J.
The Strength and Stiffness of Shafts for Ocean Steamers.

ROBERT COLLYER NOERR, Washington, D. C.
Tests to Determine the Time of Setting of Hydraulic Cements by an Automatic Recording Machine.

EUGENE PERONNEAN ROUNDEY, East Orange, N. J.
Design for a Masonry Dam for a Reservoir at Castleton, N. Y.

CHARLES FREDERICK SANDERS, Kutztown.
The Sewerage System and Sewage Filtration at Reading, Pa.

SAMUEL PALMER SENIOR, Washington, D. C.
Plans for the Surface Drainage and Sewerage of South Bethlehem.

FRANK BRADLEY SHEAFFER, New Bethlehem.
Plan for a Water Supply and Sewerage of New Bethlehem, Pa.

EDWARD PETER SHUMAN, Allentown.
Design for a Bridge over Little Lehigh River at Allentown, Pa.

JONATHAN EDWARD SLADE, Chicago, Ill.
Experiments on the Efficiency of a Turbine Water Wheel.

MICHAEL THOMAS STACK, Shenandoah.
Review of the Water Supply System of Shenandoah, Pa.

WALLACE TREICHLER, Elizabethtown.
Design for the Water Supply and Sewerage of Elizabethtown, Pa.

CHARLES PARKER WAGONER, Phœnixville.
The Strength and Best Proportion for Car and Locomotive Axles.

GILBERT CASE WHITE, Richmond, Va.
Experimental and Theoretical Investigation of the Stresses in a Suspension Cable Due to Concentrated Loads.

FOR THE DEGREE OF MECHANICAL ENGINEER.

FRANCIS DUPONT AMMEN, Ammendale, Md.
The Design of a Dynamometer for a Bicycle.

LATHROP HUTCHINGS BALDWIN, Allentown.
Discussion of Machine Lubrication.

WILLIAM BURKE BRADY, Harrisburg.
(with J. H. Pennington).
A Test of the Plant of the Harrisburg Water Works.

ALBERT ANDREW FINKH, Yonkers, N. Y.
Efficiency of the Air Compressing Plant at the Bethlehem Pumping Station.

FRANCISCO MARTINEZ GALLARDO, Guadalajara, Mexico.
The Interchangeable System as a Factor in the Economical Manufacture of Machinery.

HENRY TAYLOR IRWIN, Allegheny.
Plan of a System of Cranes for the Rosedale Foundry, Allegheny, Pa.

LAWRENCE RUST LEE, Shepherdstown, W. Va.
Motor Vehicles.

WILLIAM ADAMS MEGRAW, Baltimore, Md.
Discussion of Balanced Slide Valves.

HENRY H. NEWTON, Guadalajara, Mexico.
A Discussion of the Machinery Employed in the Manufacture of Cane Sugar.

HARRY RICHARDS PECK, Scranton.
The Design of an Electric Locomotive.

JAMES HARKINS PENNINGTON, Philadelphia.
(with W. B. Brady).
A Test of the Plant of the Harrisburg Water Works.

MORRIS HAVENS PUTNAM, Tioga.
Plans and Estimates for Increased Water Supply to Bayer Mill at Tioga, Pa.

JOHN PEAKE REYNOLDS, JR., Charleston, S. C.
Discussion of the High Duty Attachment to the Worthington Pump.

SAMUEL STEWART RIEGEL, South Bethlehem.
A Device for Insuring Flooded Lubrication of a Car Journal.

WOODFORD ROYCE, Willimantic, Conn.
Duty Test of Steam Pump at Natchang Pumping Station, Willimantic, Conn.

AUGUSTE LEOPOLD SALTZMAN, Plainfield, N. J.
Surface Condensers and Their Application to Marine Engines.

FRANCIS BETTS SMITH, Hartford, Conn.
Discussion of Power Steering Gear for the Modern Steamship.

JOHN LEEFE SHEPPARD, JR., Charleston, S. C.
Rice Chaff as Fuel.

HARVEY WILSON SPRAGUE, South Bethlehem.
Rotary Motors; also, an Efficiency Test of the Crowell Blower.

WILLIAM EDWARD UNDERWOOD, Philadelphia.
and
AMBROSE EVERETT YOHN, Saxton.
A Test of a Locomotive Boiler.

FOR THE DEGREE OF BACHELOR OF SCIENCE (IN METALLURGY).

HENRY JONATHAN BIDDLE BAIRD, West Chester.
Design of a Mill for the Reduction of Silver Ores by the Washoe Process.

JOHN BOYT, Adamsford.
Investigation of the Working of Blast Furnace A, Maryland Steel Company, Sparrow's Point, Md.

THOMAS HOLLAND CLAGETT, Berryville, Va.
Determination of the Melting Points and Specific Gravities of Various Alloys of Lead, Tin, and Antimony.

BENJAMIN IRVIN DRAKE, Chicago, Ill.
Investigation of the Working of Blast Furnace No. 1, of the Thomas Iron Company, Hokendauqua, Pa.

STUART RHETT ELLIOTT, Beaufort, S. C.
Investigation of the Various Items of Loss of Zinc in a Spelter Furnace.

TELFORD LEWIS, Blairsville.
Investigation of the Working of Blast Furnace No. 1, of the Thomas Iron Company, Hokendauqua, Pa.

JAMES GORDON MASON, West Pittston.
Determination of the Calorific Power of Anthracite Coal from the Mines of the Lehigh Valley Coal Co.

FRANK STEINMETZ YOUNG, Plymouth Meeting.
Investigation of Tests for the Presence of Gold in Cyanide Solutions.

FOR THE DEGREE OF BACHELOR OF SCIENCE (IN MINING).

JOHN STEWART, JR., Lonaconing, Md.
A Comparison of the Old and New Methods of Mining in the George's Creek Basin, Maryland.

THOMAS CEDWYN THOMAS, Wilkes-Barre.
A Discussion of the Relation of Surface Cracks to Squeezes in Mining.

FOR THE DEGREE OF ELECTRICAL ENGINEER.

HARRY LAYFIELD BELL, Norfolk, Va.
(with H. H. Seabrook).
Design and Construction of Field for a d. c. Armature.

WILLIAM RAGAN BINKLEY, Hagerstown, Md.
(with R. S. Griswold).
Investigation of the Edison Chemical Meter.

CHARLES SCHWARTZE BOWERS, Philadelphia.
(with L. Diven).
Design of a Three-Phase Alternator.

WALTER EVERETTE BROWN, Stamford, Conn.
(with O. S. Good).
The Design and Economy of an Electric Lighting Plant for Lehigh University.

LOUIS DIVEN, Elmira, N. Y.
(with C. S. Bowers).
Design of a Three-Phase Alternator.

IRA D. FULMER, Richland Centre.
(with A. R. Sterner).
Construction of a Storage Battery of the Planté Type.

ORRIN SATTERLEE GOOD, Lock Haven.
(with W. E. Brown).
The Design and Economy of an Electric Lighting Plant for Lehigh University.

RALPH SCOFIELD GRISWOLD, Madison, N. J.
(with W. R. Binkley).
Investigation of the Edison Chemical Meter.

WILLIAM STEPHEN HIESTER, Harrisburg.
(with H. S. Johnson).
Methods of Control of Street Railway Cars.

ROSS NATHANIEL HOOD, Duncannon.
Design of a Direct-Connected Dynamo for Lighting.

ARTHUR PERKINS JENKS, Yardley.
(with C. W. Thorn).
Plans and Specifications for an Electric Railroad between South Bethlehem and Friedensville.

HARRY SACKETT JOHNSON, East Aurora, N. Y.
(with W. S. Hiester).
Methods of Control of Street Railway Cars.

CHARLES VICTOR LIVINGSTON, Kingston, N. Y.
(with C. F. Scott).
Design of a Multipolar Railway Generator.

ARTHUR FROST LOOMIS, Oneida, N. Y.
(with C. P. Nachod).
Tests of Motor Electric Meters.

BARRY MACNUTT, Bethlehem.
(with H. R. Van Duyne).
Analysis of Coal by Means of X-Rays.

CARL PIVANY NACHOD, Glenside.
(with A. F. Loomis).
Tests of Motor Electric Meters.

CHARLES FRANCIS SCOTT, New York City.
(with C. V. Livingston).
Design of a Multipolar Railway Generator.

HENRY HAMILTON SEABROOK, Beaufort, S. C.
(with H. L. Bell).
Design and Construction of Field for a d. c. Armature.

ARTHUR HAROLD SERRELL, Plainfield, N. J.
(with P. B. Straub).
Tests of Electrically Heated Utensils.

ALVIN RIEGEL STERNER, Bethlehem.
(with I. D. Fulmer).
Construction of a Storage Battery of the Planté Type.

PAUL BENO STRAUB, Pittsburg.
(with A. H. Serrell).
Tests of Electrically Heated Utensils.

HARRISON RICORD VAN DUYNE, Newark, N. J.
(with B. Mac Nutt).
Analysis of Coal by means of X-Rays.

JOHN EUGENE WEIDEMAN, Washington, D. C.
The Love Electric Railway Conduit System, as installed on the Rock Creek Railway, Washington, D. C.

GEORGE LIVINGSTON YATES, Carlisle.
Submarine Telephony.

FOR THE DEGREE OF ANALYTICAL CHEMIST.

BERTINE FREDERIC BORHEK, West Bethlehem.
Illuminating Gas.

PATRICK EDWARD DINAN, South Bethlehem.
The Petroleum Industry.

UNIVERSITY DAY.

This day is the last of the academic year, and falls in 1898 on the third Wednesday in June. On this day orations are delivered by members of the graduating class, and degrees are conferred.

EXERCISES ON JUNE 16, 1897.

MUSIC.

READING OF SCRIPTURE AND PRAYER.

MUSIC.

Salutatory Oration.—"Duties to the State."
WILLIAM RAGAN BINKLEY.

MUSIC.

Oration.—"Battling the Elements."
THOMAS CEDWYN THOMAS.

Oration.—"Engineering Science."
AMBROSE EVERETT YOHN.

MUSIC.

Alumni Address.—"The Relations of the Alumni to the University."
CASPAR WISTAR HAINES, A.M., C.E., Class of 1874.

MUSIC.

Valedictory Oration.—"Problematical Life and Science."
WALTER EVERETTE BROWN.

MUSIC.

Award of the Wilbur Scholarship to
EUGENE GIFFORD GRACE, of Goshen, N. J.,
first in rank in the Sophomore Class;
with honorable mention of

ARTHUR WARNER KLEIN, of Bethlehem, and
JOHN WESLEY GRACE, JR., of Goshen, N. J.

The Wilbur Prizes, for excellence in the studies of Freshman year, were awarded as follows:

In Mathematics, to
ALBERT WILLIAM BAYARD, of Washington, D. C., and
LOUIS ORTNER, of Drifton.

In French, to
JOHN FRANCIS BENSON, of Portsmouth, Va.

In German, to
JOHN NICHOLAS REESE, of Harrisburg.

In English, to
JOSEPH WILLIAM BURKE, of Shenandoah, and
JOHN WILLIAM FLETCHER, of Skowhegan, Maine.

In Freehand Drawing, to
THOMAS FRANCIS BELL, of Shenandoah.

In General Chemistry, to
THOMAS WINDLE LUKENS, of Atglen.

Degrees were then conferred by the President of the University upon the candidates whose names appear in the Thesis List, as given above.

THE WILBUR SCHOLARSHIP.

This Scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200 awarded annually to the student in the Sophomore Class having the best record.

THE ALUMNI SCHOLARSHIP FUND.

The Alumni Association of the University has established a Scholarship Fund, for the assistance of worthy students. Such assistance is to be given in the form of loans, secured by notes properly endorsed, subject to the following conditions:

1. That loans from this fund shall be made only to students in need of such help.

2. That help in this form shall not be given during the first year of any student's course; he must without this aid have gone through one year, and must be prepared to start the second year free from all conditions.

3. That help in this form shall not be continued to a student who shall at any time during his course carry any condition over eight weeks beyond the date of the examination in which he failed.

Subject only to the above conditions the disposal of the fund shall until otherwise directed be in the hands of the President of the University.

THE HENRY S. HAINES MEMORIAL SCHOLARSHIP.

Mrs. Henry S. Haines, of Savannah, Ga., has established a scholarship of the annual value of $200, which is to be devoted to the support at the Lehigh University, throughout his scholastic career, of one student in the School of Mechanical Engineering.

THE FRED. MERCUR MEMORIAL FUND SCHOLARSHIPS.

Friends of the late Frederick Mercur, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, have contributed and placed in the hands of the Trustees a fund, to be called "The Fred. Mercur Memorial Fund," sufficient in amount to insure the award of several scholarships for free tuition in the University.

THE ECKLEY B. COXE MEMORIAL FUND.

In memory of the late Eckley B. Coxe, trustee of the University, Mrs. Coxe has established a Fund, amounting to $20,000, the interest of which is to be used, under the direction of the Trustees of the University, and subject to such regulations as they may adopt, for the assistance of students who without such aid would not be able to meet the cost of living as students of the University.

WILBUR PRIZES.

By the generosity of E. P. Wilbur, Esq., a fund has been established, yielding an annual income of $100, for distribution in prizes as the Faculty shall determine.

THE PRICE PRIZE FOR ENGLISH COMPOSITION.

Dr. Henry R. Price, an Alumnus and Trustee of the University, has established an annual prize of the value of $25, to be awarded in June to that member of the Sophomore class who shall write the best essay on a topic in

English Literature assigned by the head of the department of English not later than the beginning of the Second Term in each year.

In estimating the value of all such essays the greatest stress will be laid upon clearness of thought and idiomatic force of expression; and, while looking for correctness of thought put into clear and forcible English, expression will take precedence of ideas in the judgment of the examiner, and for this specific end, greater weight will be given to the form rather than to the matter presented.

Competitors must signify their intent not later than the first of May.

The subject for the prize essay in June, 1898, will be: "A Critical Estimate of the Writings of Thackeray."

ALUMNI PRIZES FOR ORATORY.

The Alumni Association of the University has established an annual sum of Fifty Dollars, to be distributed in prizes for excellence in Oratory, subject to the following

REGULATIONS.

1. The Contest shall be held on the 22d day of February, or on the day designated by the University for commemorating the birthday of Washington.

2. There shall be a first prize of $25, a second of $15, and a third of $10.

3. To entitle one to be a competitor he must be a member of the Junior Class, taking a regular course.

4. Subjects for the orations shall be announced at the beginning of the first term of every year, and upon one of these each competitor shall write an oration not to exceed 1,200 words, taking about eight minutes in delivery.

5. Each oration shall bear upon its first page a fictitious name or motto, and shall be accompanied by a sealed envelope, which shall be superscribed with the same name or motto, and an address by which it may be reclaimed. The envelope shall contain the real name and address of the writer, with the declaration that the oration is his

own original work. The examiner, having adopted a standard of excellence, may reject any or all of the orations presented which do not attain to this standard; of such as do—should they be sufficient in number—the best six shall be chosen, and their envelopes opened. The others shall be returned to the addresses given, with their envelopes unopened.

6. The Executive Committee of the Alumni Association, or a committee of not fewer than three to be appointed by them, shall hear the competitors whose orations shall have been approved, and the awards shall be made by a majority of these judges.

7. In awarding the prizes the judges shall consider both the literary merits and the delivery of each oration.

8. These rules are subject to amendment by the Faculty.

The annual contest in Oratory for the Alumni Prizes was held on February 22, 1897, with the following competitors:

David Hope Childs, of Towanda.

Herbert Henninger Hess, of Hellertown.

Frank Norman Kneas, of Norristown.

Basil George Kodjbanoff, of Monastir, Macedonia.

Lewis Cheston Starkey, of Bustleton.

The First Prize was awarded to Lewis Cheston Starkey; the Second to Basil George Kodjbanoff; the Third to David Hope Childs.

ENTRANCE EXAMINATION PAPERS.

Used for Examinations in 1897.

I.—ENGLISH.

I. Grammar.

1. Correct the following specimens of false syntax and give the reason for each correction:

a. Avoid rude sports: an eye is soon lost, or bone broken. *b.* The place is not mentioned by geographers which wrote at that time. *c.* Those kind of people you will find to be troublesome. *d.* Eve was the fairest of all her daughters. *e.* It is impossible continually to be at work.

2. Define Grammar, English Grammar, Orthography, Etymology, Syntax, and Prosody. Name the ten parts of speech.

3. Define a sentence, a clause, a subordinate clause. Define a noun, a proper noun, a common noun, a collective noun, an abstract noun.

4. Write the entire conjugation of the verb *to be*, naming each mood, tense, number, and person.

5. Analyze the following sentence thoroughly, and parse the words underlined: *I* think boys *said* the schoolmaster *when* the clock struck twelve *that* I shall give *you* a half holiday this afternoon.

II. Rhetoric.

1. Define Rhetoric, Style, Figure of Speech, Diction, and Composition.

2. Name the essential qualities of a good style. What rules should govern our choice of words?

3. By what principles should we be guided in the use of new words, colloquial expressions, archaic terms, provincial words, technical words, foreign words?

4. Define and give an example of each of these: Synecdoche, Metonymy, Simile, Metaphor, Allegory.

5. Give one example of Apostrophe, Hyperbole, Irony, Antithesis, Climax.

6. Write a periodic sentence, a loose sentence, a balanced sentence; what errors are involved in redundancy, circumlocution, anti-climax?

III. Composition.

Write a short piece of descriptive prose, free from errors in punctuation, spelling, and paragraphing, on the subject: The story of Shakespeare's "As You Like It."

II.—UNITED STATES HISTORY.

1. What were the Alien and Sedition Laws, and under whose administration were they passed?

2. State the principal events of Madison's administration.

3. What is the Monroe Doctrine? What were the political parties during Monroe's administration and what did each party favor?

4. Name one of the most remarkable events of the second term of Cleveland's administration and describe the prevalent character of that administration.

5. What were the principal events of Grant's administration?

6. What exceptional measure was taken at the election of Mr. Hayes?

II.

7. Is the election of President in strict accord with the spirit of the Constitution? If not, why?

8. In what body are the judicial powers of the United States vested?

9. What provision is made for the amendment of the Constitution?

10. Where do all bills for raising revenue originate?

III.—GEOMETRY.

1. Define Geometrical Figure; Ratio of Similitude; Diedral Angles; Lateral Area; Lune; Angle of two curves; Regular Polyedron.

2. What are similar cylinders of revolution? When is a line said to be harmonically divided? State difference between *equal figures* and *equivalent figures*.

3. The three perpendiculars from the vertices of a triangle to the opposite sides meet in the same point.

4. An angle formed by a tangent and a chord is measured by one-half the intercepted arc.

5. Three angles of a certain regular polygon are together equal to 5 right angles. How many sides has the polygon?

6. Explain a method of computing π.

7. Prove that the area of a regular inscribed dodecagon is equal to three times the square of the radius.

8. The sum of any two face angles of a triedral angle is greater than the third.

9. Through a given point to pass a plane tangent to a given cylinder.

10. In two polar triangles, each angle of one is measured by the supplement of the side lying opposite to it in the other.

11. A triangular pyramid has a base of 8 sq. ft. and altitude of 16 ft. At what distance from the vertex must a plane be passed parallel to the base so that the section shall contain 3 square feet?

12. The area of a zone is equal to the product of its altitude by the circumference of a great circle.

IV.—ALGEBRA.

1. When is an equation said to be "satisfied?" What is verifying an equation? What is *elimination by substitution?* How do you get rid of a negative exponent?

2. State difference between *term* and *factor*. Define *geometrical progression* and derive expression for the sum.

III. Simplify

(a) $$\left(\frac{a}{x+a}-\frac{x}{x-a}\right)\div\frac{x^2+a^2}{x^2+ax}.$$

(b) $$\frac{n}{1+x^n}+\frac{n}{1-x^n}.$$

IV. Expand (a) $(2a-3b)^5$. (b) $\frac{1}{\sqrt{1-x^2}}$ to 4 terms.

V. Resolve into factors (a) $x^3+y^3+3xy(x+y)$;

(b) $x^3-\frac{4}{x}$.

VI. Find the square root of $4a^4+9(1-2a)+3a^2(7-4a)$.

VII. Solve

(a) $\frac{x+3}{x-1}+\frac{x-4}{x-6}=2$. (b) $\frac{x-11}{3}+y=18$, $2x+\frac{y-13}{4}=29$.

VIII. Find H. C. F. of a^3-2a-4 and a^3-a^2-4.

Find L. C. M. of x^3+y^3, $3x^2+2xy-y^2$ and $x^3-x^2y+xy^2$.

IX. The price of photographs is raised \$3.00 per dozen and customers consequently get 10 less than before for \$5.00. What were the prices charged?

X. Find two numbers whose sum is 22, and the difference of whose squares is 250.

XI. Solve $x^6=8+7x^3$.

XII. Find three consecutive numbers such that if they be divided by 10, 17, and 26 respectively, the sum of the quotients will be 10.

V.—PHYSICS.

1. Define: *a.* Gram; *b.* Foot-pound; *c.* Tension of a Gas; *d.* Magnetic Field; *e.* Electrolysis; *f.* Overtone; *g.* Convection of Heat; *h.* Specific Heat; *i.* Principal Focus of a Lens; *j.* Achromatic Lens.

2. A body weighing 100 lbs. rests upon an inclined

plane 10 feet long and one foot high. Represent this weight on paper (letting $\frac{1}{10}$ inch = 10 lbs.) and find, by resolution of forces, what lines represent the pressure on the plane and the force necessary to keep the body from rolling down.

3. State (*a*) Pascal's Law of Liquid Pressure; (*b*) Law of the Screw; (*c*) Laws of the Pendulum.

4. Find the specific gravity and the volume of a piece of brass which weighs 54.00 g. in air and 47.25 g. in water.

5. A current of 0.4 ampere is required in a circuit consisting of a battery, resistance box, and line wire; (*a*) If the resistance of battery and line is 6 ohms and E.M.F. of battery is 10 volts, what resistance must be inserted in the box? (*b*) Calculate the heating effect in joules per minute in the box.

6. Name a unit commonly used for measuring each of the following: (*a*) Energy; (*b*) Heat; (*c*) Difference in Potential; (*d*) Quantity of Electricity; (*e*) Electric Power.

7. Explain the action of a freezing mixture composed of salt and ice.

8. A piece of copper weighing 126 g. is heated up to 98° C. and dropped into 300 g. of water at 20° C. The temperature of the mixture is found to be 23° C. Calculate the specific heat of copper.

9. Explain what sound is and how it travels through air. What is its velocity in air? Name the three characteristics of a musical tone.

10. Explain why grass appears green. Show by a diagram how images are formed by a convex lens and explain how this principle is applied in either a photographic camera or a telescope.

VI.—PHYSICAL GEOGRAPHY.

1. Explain cause of rainbow. Why is it circular in form?

2. What causes tides? Explain spring and neap tides.

3. How do trade winds originate?

4. Explain fully the origin of ocean currents.

5. How are glaciers formed?

6. Describe the phenomena of a thunder shower and explain their cause.

7. What is meant by "erosion" and how may it change the course of a river?

VII.—LATIN.

I. Grammar.

1. Give the genitive plural of *miser*, *lex;* the ablative singular of *portus*, *litus*, *senex;* and the nominative singular of *frigoribus*, *nives*, *sidere*, *tramite*, *rores*.

2. Decline in full *caput*, *movens*, *qui*, *arx*, *domus*, *portus*, *deus*, *dea*, and *duo*.

3. Compare *facilis*, *benevolus*, *bene*, *nequam*, *parvus*, *male*. What is the difference between *decem*, *decimus*, *deni*, and *decies*.

4. Give all the participles of *vereor;* the perfect and supine of *intelligo*, *fundo*, *veho;* the present subjunctive of *volo* and *eo;* the future indicative active of *curro* and *moveo;* and the principal parts of *cado*, *caedo*, *cedo*, *juvo*, *caveo*, *gaudeo*, *fingo*, and *pendo*.

5. State the cases governed by *fungor*, *celo*, *dono*, *rogo*, *impero*, *vescor*, *coram*, *penes*, *propter*, *cupidus*, *patiens*, *praeditus*, *similis*.

6. Mention the various ways of expressing purpose in Latin and translate to illustrate the rules: He sent ambassadors to seek peace.

7. Give the principal parts of the verbs to which the following participles belong: *electus*, *fissus*, *repertus*, *expertus*, *orsus*, *nactus*, *mensus*, *confisus*, *dilectus*, *lotus*.

8. Give the rules for changing the construction from *oratio recta* to *oratio obliqua*.

9. Give the rule for "price" and "place whither," and translate:

(*a*). He sent an army to Carthage, in Africa.

(*b*). He sold the slave for three talents.
(*c*). He values him more every day.

10. What classes of words take the genitive?

II. Caesar.

Translate:

Quamobrem placuit ei, ut ad Ariovistum legatos mitteret, qui ab eo postularent, uti aliquem locum medium utriusque colloquio diceret: velle sese de republica et summis utriusque rebus cum eo agere. Ei legationi Ariovistus respondit: si quid ipsi a Caesare opus esset, sese ad eum venturum fuisse; si quid ille se velit, illum ad se venire oportere. Praeterea se neque sine exercitu in eas partes Galliae venire audere, quas Caesar possideret, *neque exercitum sine magno commeatu atque molimento in unum locum contrahere posse. Sibi autem mirum videre, quid in sua Gallia, quam bello vicisset, aut Caesari aut omnino populo Romano negotii esset.—B. G., I., 34.*

1. Who was Ariovistus? 2. To whom does *ei* refer (line 1)? 3. What was the occasion of this embassy? 4. Change the words in ITALICS to the *oratio recta.*

III. Vergil.

Translate:

Tempus erat, quo prima quies mortalibus aegris
Incipit, et dono divum gratissima serpit:
In somnis, ecce, ante oculos maestissimus Hector
Visus adesse mihi, largosque effundere fletus,
Raptatus bigis, ut quondam aterque cruento
Pulvere, perque pedes traiectus lora tumentes.
Hei mihi, qualis erat! quantum mutatus ab illo
Hectore, qui redit exuvias indutus Achilli,
Vel Danaum Phrygios iaculatus puppibus ignes!
Squalentem barbam et concretos sanguine crines,
Vulneraque illa gerens, quae circum plurima muros
Accepit patrios. *Aen., II., 268–279.*

1. Explain the case of *lora* and of *exuvias.*
2. Explain the allusion in *raptatus bigis.*

3. *a.* Divide the last four lines of this passage into feet and mark the rhythmic accent.
   b. Give the reasons for your divisions.
   c. When is a syllable in which a short vowel comes before two consonants long, and when is it common?

Translate:

Dixerat. Ille patris magni parere parabat
Imperio; et primum pedibus talaria nectit
Aurea, quae sublimem alis sive aequora supra
Seu terram rapido pariter cum flamine portant.
Tum virgam capit; hac animas ille evocat Orco
Pallentis, alias sub Tartara tristia mittit,
Dat somnos adimitque et lumina morte resignat.

Aen., IV., 238–244.

IV. Cicero.

Translate (Cat., II., 6):

At etiam sunt qui dicant, Quirites, a me in exsilium eiectum esse Catilinam: quod ego si verbo adsequi possem, istos ipsos eiicerem, qui haec loquuntur. Homo enim videlicet timidus aut etiam permodestus vocem consulis ferre non potuit; simul atque ire in exsilium iussus est, paruit: Quid? ut hesterno die, Quirites, cum domi meae paene interfectus essem, senatum in aedem Iovis Statoris convocavi, rem omnem ad patres conscriptos detuli: quo cum Catilina venisset, quis eum senator appellavit?

1. Explain the mood and tense of *dicant, eiicerem, interfectus essem.* 2. Why is the preposition used with *me* (line 1)? 3. What does *hesterno die* modify? 4. Why was the temple of Jupiter Stator selected for this meeting of the senate?

Translate (Cat., IV., 5):

At vero C. Caesar intelligit legem Semproniam esse de civibus Romanis constitutam, qui autem reipublicae sit hostis, eum civem esse nullo modo posse; denique ipsum latorem legis Semproniae iniussu populi poenas republicae dependisse.

1. Explain the mood of *sit*, *posse*. 2. What is the antecedent of *qui?* 3. Why are *civem* and *latorem* in the accusative? 4. What mode of punishment did Caesar advise?

V. Sight Reading.

Translate (Caesar, *B. G.*, *V.*, *53*):

Neque ullum fere totius hiemis tempus sine sollicitudine Caesaris intercessit, quin aliquem de consiliis ac motu Gallorum nuntium acciperet. In his ab Lucio Roscio, quem legioni decimae tertiae praefecerat, certior est factus, magnas Gallorum copias earum civitatum, quae Armoricae appellantur, oppugnandi sui causa convenisse, neque longius milia passuum octo ab hibernis suis afuisse, sed nuntio allato de victoria Caesaris discessisse, adeo ut fugae similis discessus videretur.

Translate (Cicero, *Mil*, *34*):

Valeant, inquit, valeant cives mei; sint incolumes, sint florentes, sint beati; stet haec urbs praeclara mihique patria carissima, quoquo modo erit merita de me; tranquilla re publica mei cives, quoniam mihi cum illis non licet, sine me ipsi, sed propter me tamen perfruantur; ego cedam atque abibo: si mihi bona re publica frui non licuerit, at carebo mala, et quam primum tetigero bene moratam et liberam civitatem, in ea conquiescam.

VI. Composition.

Translate into Latin:

1. He asked me to read the letter which he had received. 2. He says that he praises the pupils because they are diligent. 3. We were in Rome the whole winter. 4. I have already repented of my folly. 5. I am afraid the enemy have seized the citadel. 6. Have you heard when they intend to come? 7. They ought to have done that before. 8. I do not know how large a force he had. 9. We will endeavor to take with us all the grain which we now have. 10. Caesar and I pity the poor and we will help them.

VII. History.

1. Explain the origin and nature of the Tribuneship.

2. Explain the classification of the Roman people and the constitution which was based on this classification.

3. Give the cause, duration, and results of the struggle between Rome and Carthage.

4. What were the internal causes of the weakness of Rome?

5. Give an account of the several Comitia.

VIII.—GREEK.

I.—Grammar.

1. Give the indefinite, demonstrative, and relative adverbs corresponding to the interrogatives *πότε* and *πόθεν*.

2. What is the quantity of the ultima in *σῶμα*, *χώρα*, *ἄνθρωποι*, *ἀγγέλλοι*, and of the penult in *κρῖνε*? How is it shown in each case, and what rules are involved?

3. Decline, through all numbers, *δόξα*, *ὁδός*, *πατήρ*, *πόλις*.

4. Compare the adjectives *μέγας*, *ἡδύς*, *σοφός*, the adverb *μάλα*.

5. Give the synopsis (*i. e.*, first form in each mode) of the perfect middle, first aorist active, and future active of *φαίνω*. Inflect through the numbers and persons the imperfect active and middle of *τίθημι*, the aorist subjunctive passive of *λύω*.

6. Analyze *λύσουσι*.

7. What prepositions are used with one case only, and with what case respectively?

II.—Xenophon.

1. Translate:

ἀλλ' ἐγώ φημι ταῦτα μὲν φλυαρίας εἶναι· δυκεῖ δέ μοι ἄνδρας ἐλθόντας πρὸς Κῦρον οἵτινες ἐπιτήδειοι σὺν Κλεάρχῳ ἐρωτᾶν ἐκεῖνον τί βούλεται ἡμῖν χρῆσθαι· καὶ ἐὰν μὲν ἡ πρᾶξις ᾖ παραπλησία οἵαπερ καὶ πρόσθεν ἐχρῆτο τοῖς ξένοις, ἕπεσθαι καὶ ἡμᾶς καὶ μὴ κακίους εἶναι τῶν πρόσθεν τούτῳ συναναβάντων· ἐὰν δὲ

μείζων ἡ πρᾶξις τῆς πρόσθεν φαίνηται, ἀξιοῦν ἢ πείσαντα ἡμᾶς ἄγειν ἢ πεισθέντα πρὸς φιλίαν ἀπιέναι.—(An. I. 3, 18.)

Construction of *οἵαπερ* and of *πεισθέντα*? On what does *ἕπεσθαι* depend?

2. Translate:

ταῦτα οὖν φιλοπολέμου μοι δοκεῖ ἀνδρὸς ἔργα εἶναι, ὅστις ἐξὸν μὲν εἰρήνην ἔχειν ἄνευ αἰσχύνης καὶ βλάβης αἱρεῖται πολεμεῖν, ἐξὸν δὲ χρήματα ἔχειν ἀκινδύνως αἱρεῖται πολεμῶν μείονα ταῦτα ποιεῖν· ἐκεῖνος δὲ ὥσπερ εἰς παιδικὰ ἢ εἰς ἄλλην τινὰ ἡδονὴν ἤθελε δαπανᾶν εἰς πόλεμον.—(An. II. 6, 6.)

Construction of *ἐξόν*? Of whom is this character given?

3. Translate:

τοῦτο δὲ λέγοντος αὐτοῦ πτάρνυταί τις· ἀκούσαντες δ' οἱ στρατιῶται πάντες μιᾷ ὁρμῇ προσεκύνησαν τὸν θεόν, καὶ Ξενοφῶν εἶπε, Δοκεῖ μοι, ὦ ἄνδρες, ἐπεὶ περὶ σωτηρίας ἡμῶν λεγόντων, οἰωνὸς τοῦ Διὸς τοῦ σωτῆρος ἐφάνη, εὔξασθαι τῷ θεῷ τούτῳ θύσειν σωτήρια ὅπου ἂν πρῶτον εἰς φιλίαν χώραν ἀφικώμεθα, συνεπεύξασθαι δὲ καὶ τοῖς ἄλλοις θεοῖς θύσειν κατὰ δύναμιν. καὶ ὅτῳ δοκεῖ ταῦτ', ἔφη, ἀνατεινάτω τὴν χεῖρα. καὶ ἀνέτειναν ἅπαντες. ἐκ τούτου εὔξαντο καὶ ἐπαιάνισαν.—(An. III. 2, 9.)

Reason for the subjunctive in *ἀφικώμεθα*? Construction of *ἡμῶν*? Construction of the antecedent of *ὅτῳ*?

4. Translate:

ἐντεῦθεν ἔπεμψαν νυκτὸς Δημοκράτην Τεμενίτην ἄνδρας δύντες ἐπὶ τὰ ὄρη, ἔνθα ἔφασαν οἱ ἀποσκεδαννύμενοι καθορᾶν τὰ πυρά· οὗτος γὰρ ἐδόκει καὶ πρότερον πολλὰ ἤδη ἀληθεῦσαι τοιαῦτα, τὰ ὄντα τε ὡς ὄντα καὶ τὰ μὴ ὄντα ὡς οὐκ ὄντα. πορευθεὶς δὲ τὰ μὲν πυρὰ οὐκ ἔφη ἰδεῖν, ἄνδρα δὲ συλλαβὼν ἧκεν ἄγων ἔχοντα τόξον Περσικὸν καὶ φαρέτραν καὶ σάγαριν, οἵανπερ αἱ Ἀμαζόνες ἔχουσιν. ἐρωτώμενος δὲ τὸ ποδαπὸς εἴη, Πέρσης μὲν ἔφη εἶναι, πορεύεσθαι δ' ἀπὸ τοῦ Τιριβάζου στρατεύματος, ὅπως ἐπιτήδεια λάβοι.—(An. IV. 4, 15.)

Construction of *νυκτός*? To what does *τό* belong? Reasons for the optatives *εἴη* and *λάβοι*?

III.—HOMER.

1. Translate:

"Ὦ πόποι, ἦ μέγα πένθος Ἀχαιΐδα γαῖαν ἱκάνει.
ἦ κεν γηθήσαι Πρίαμος Πριάμοιό τε παῖδες,
ἄλλοι τε Τρῶες μέγα κεν κεχαροίατο θυμῷ,
εἰ σφῶϊν τάδε πάντα πυθοίατο μαρναμένοιιν,
οἳ περὶ μὲν βουλὴν Δαναῶν, περὶ δ' ἐστὲ μάχεσθαι."
—(Il. I. 254–258.)

Make a list of the forms in these lines peculiar to Homer, adding, in each case, the corresponding Attic form.

Explain the form *κεχαροίατο*.

2. Translate:

"πῇ δὴ συνθεσίαι τε καὶ ὅρκια βήσεται ἡμῖν;
ἐν πυρὶ δὴ βουλαί τε γενοίατο μήδεά τ' ἀνδρῶν,
σπονδαί τ' ἄκρητοι καὶ δεξιαὶ, ᾗς ἐπέπιθμεν·
αὔτως γάρ ῥ' ἐπέεσσ' ἐριδαίνομεν, οὐδέ τι μῆχος
εὑρέμεναι δυνάμεσθα, πολὺν χρόνον ἐνθάδ' ἐόντες."
—(Il. II. 339–343.)

Where is *ἐπέπιθμεν* made? What is the derivation of *σπονδαί*? the reason for the gender of *δεξιαί*? What other forms in Homer of *ἐπέεσσι*? What length of time denoted by *πολὺν χρόνον*?

3. Translate:

ὣς ἄρ' ἔφαν, πάλλεν δὲ μέλας κορυθαίολος Ἕκτωρ
ἀψ δρόων· Πάριος δὲ θοῶς ἐκ κλῆρος ὄρουσεν.
οἱ μὲν ἔπειθ' ἵζοντο κατὰ στίχας ἥχι ἑκάστου
ἵπποι ἀερσίποδες καὶ ποικίλα τεύχε' ἔκειτο·
αὐτὰρ ὅ γ' ἀμφ' ὤμοισιν ἐδύσετο τεύχεα καλὰ
δῖος Ἀλέξανδρος, Ἑλένης πόσις ἠυκόμοιο.
ὣς δ' αὔτως Μενέλαος ἀρήιος ἔντε' ἔδυνεν.
—(Il. III. 324–329, 339.)

What was determined by the process described in the first two lines? Why are the words *ἀψ δρόων* added? What was the issue of the combat that followed?

IV.—SIGHT READING.

ἐπεὶ δὲ μέγα φρονήσας ὁ Τισσαφέρνης ἐπὶ τῷ καταβάντι στρατεύματι παρὰ βασιλέως προεῖπεν Ἀγησιλάῳ πόλεμον, εἰ μὴ ἀπίοι ἐκ τῆς Ἀσίας, οἱ μὲν ἄλλοι σύμμαχοι καὶ Λακεδαιμονίων οἱ παρόντες μάλα ἀχθεσθέντες φανεροὶ ἐγένοντο, Ἀγησίλαος δὲ μάλα φαιδρῷ τῷ προσώπῳ ἀπαγγεῖλαι Τισσαφέρνει τοὺς πρέσβεις ἐκέλευσεν ὡς πολλὴν χάριν αὐτῷ ἔχοι, ὅτι ἐπιορκήσας αὐτὸς μὲν πολεμίους τοὺς θεοὺς ἐκτήσατο τοῖς δ' Ἕλλησι συμμάχους ἐποίησεν. ἐκ δὲ τούτου εὐθὺς τοῖς μὲν στρατιώταις παρήγγειλε συσκευάζεσθαι ὡς εἰς στρατείαν, ταῖς δὲ πόλεσιν εἰς ἃς ἀνάγκη ἦν ἀφικνεῖσθαι στρατευομένῳ ἐπὶ Καρίαν προεῖπεν ἀγορὰν παρασκευάζειν.

V.—HISTORY.

1. Give a brief account of Demaratos (the friend of Xerxes); of Brasidas; of Pelopidas.

2. Mention any events you recall between the Persian and Peloponnesian wars.

3. Describe the formation of the first Athenian confederacy and the process of its change into an empire.

4. Describe *ostracism*. Against what individuals is it known to have been put into effect?

STUDENTS.

Clas.—Classical.
L.S.—Latin-Scientific.
Sci.—Science and Letters.
A.C.—Analytical Chemistry.
C.E.—Civil Engineering.
E.M.—Mining Engineering.
M.E.—Mechanical Engineering.
E.E.—Electrical Engineering.
Arch.—Architecture.

GRADUATE STUDENTS.

	For Degree.	Residence.
Noble C. Banks, B.S.,	E.M.,	Telluride, Colo.
John Boyt, B.S.,	E.M.,	Adamsford.
Henry M. S. Cressman, B.A.,	M.A.,	Egg Harbor City, N.J.
Walter Joseph Dech, B.A.,	M.A.,	Bethlehem.
Charles Meirs Denise, B.S.,	C.E.,	Allentown, N. J.
Stuart Rhett Elliott, B.S.,	E.M.,	Beaufort, S. C.
Francisco M. Gallardo, M.E.,	C.E.,	Guadalajara, Mex.
Wm. H. Hoffman, B.C.E.,	M.S.,	Lafayette, Ind.
Elmer Aug. Jacoby, B.A.,	M.A.,	Pennsburg.
Henry Kemmerling, C.E.,	M.S.,	Scranton.
William A. Lambert, B.A.,	M.A.,	Philadelphia.
Barry MacNutt, E.E.,	M.S.,	Bethlehem.
John Thomas Morrow, M.E.,	E.E.,	Great Falls, Montana.
David K. Nicholson, M.E.,	M.S.,	Braddock.
John Eugene Stocker, B.S.,	M.S.,	Upper Alton, Ill.
Thomas C. Thomas, B.S.,	E.M.,	Wilkes-Barre.
Clinton G. Tudor, B.S.,	C.E.,	Sault Ste. Marie, Mich.
Henry Storrs Webb, B.S.,	M.S.,	South Bethlehem.

SENIOR CLASS.

	COURSE.	RESIDENCE.
Harry Leigh Adams,	C.E.,	Washington, D. C.
Alanson Quigley Bailey,	Clas.,	Paterson, N. J.
Junius Ballard,	M.E.,	Louisburg, N. C.
Alejandro Barrientos,	C.E.,	Santiago de Cuba.
Henry David Bishop,	M.E.,	Bethlehem.
Henry Theodore Borhek,	E.M.,	Bethlehem.
Daniel John Broughal,	A.C.,	South Bethlehem.
Horatio Francis Brown,	M.E.,	Baltimore, Md.
Paul Bucher,	E.E.,	Lebanon.
David Hope Childs,	E.M.,	Towanda.
Herbert Myron Daggett, jr.,	E.E.,	Elmira, N. Y.
George Davies,	M.E.,	Catasauqua.
William Adams Dehm,	C.E.,	New Britain, Conn.
John Jacob Eckfeldt,	M.E.,	Conshohocken.
Linden Erle Edgar,	M.E.,	Wilkes-Barre.
Edgar Davis Edmonston,	E.E.,	Washington, D. C.
James Ralph Farwell,	C.E.,	Oswego, N. Y.
Edgar Raymond Frisby,	C.E.,	Washington, D. C.
Willard Boyer Fuller,	M.E.,	Catasauqua.
Robert Edward Lee George,	E.E.,	Ellicott City, Md.
William Gratz,	E.E.,	Carmel, N. J.
John Lewis Gross,	M.E.,	Wilkes-Barre.
Frank Hammond Gunsolus,	C.E.,	Tipton, Iowa.
Wentworth Greene Hare,	M.E.,	Philadelphia.
Raymond Hazel,	E.E.,	Cressona.
Henry Bruner Hershey,	E.E.,	Columbia.
Herbert Henninger Hess,	E.E.,	Hellertown.
Edward Darling Hillman,	M.E.,	Wilkes-Barre.
Harold John Horn,	E.E.,	South Bethlehem.
Leonard Sherman Horner,	E.E.,	Marshall, Va.
Frank Norman Kneas,	C.E.,	Norristown.
Arthur Octavius Knight,	M.E.,	Westfield, N. J.
Basil George Kodjbanoff,	M.E.,	Monastir, Macedonia.
Jacob B. Krause,	Clas.,	South Bethlehem.
Thomas H. Lawrence,	E.E.,	Danville.

	COURSE.	RESIDENCE.
John Brown Lindsey, jr.,	C.E.,	Frankfort, Ky.
Clarence Albert Loomis,	C.E.,	Plainfield, N. J.
Owen Francis Luckenbach,	M.E.,	Bethlehem.
Lee Holmes Marshall,	M.E.,	Pittsburg.
Charles Francis Moritz,	E.E.,	South Bethlehem.
Charles G. Newton,	C.E.,	Guadalajara, Mex.
José Aristides de Obaldia,	C.E.,	Panama, Rep. Col.
John O'Reilly,	A.C.,	South Bethlehem.
Howard Charles Paddock,	C.E.,	East Berlin, Conn.
Frederick Allen Perley,	C.E.,	Williamsport.
Carroll Winston Quarrier,	M.E.,	Charleston, W. Va.
Victor Clinton Records,	C.E.,	Laurel, Del.
Percy Lawrence Reed,	C.E.,	New Bedford, Mass.
Benjamin DeWitt Riegel,	M.E.,	Riegelsville, N. J.
D'Arcy Wentworth Roper,	M.E.,	Petersburg, Va.
Rafael Francisco Sanchez,	E.M.,	Gibara, Cuba.
Henry Cord Schwecke,	E.E.,	Charleston, S. C.
Daniel Franklin B. Shepp,	C.E.,	Tamaqua.
B. Roland Smoot,	A.C.,	Provo City, Utah.
Lewis Cheston Starkey,	M.E.,	Bustleton.
James Willis Stauffer,	C.E.,	South Bethlehem.
Martin Shaaff Stockett,	Clas.,	Pottsville.
E. Harrison Symington,	M.E.,	Baltimore, Md.
Edward Hileman Waring,	M.E.,	Plainfield, N. J.
Charles Bartlett Warren,	M.E.,	Westfield, Mass.
Levi Watts, jr.,	E.E.,	Terre Hill.
Charles Edward Webster, jr.,	Clas.,	South Bethlehem.
Theodore Benjamin Wood,	M.E.,	Chambersburg.
Lawrence Wooden,	C.E.,	Hampstead, Md.
Warren Worthington,	M.E.,	Rushland.
Samuel Augustus Yorks, jr.,	E.E.,	Danville.
Harry Statten Zimmerman,	C.E.,	State Line.

JUNIOR CLASS.

	COURSE.	RESIDENCE.
G. Fred Allen,	C.E.,	Florida, N. Y
Leon Whetstone Bailey,	E.E.,	Delano.

	COURSE.	RESIDENCE.
Richard Charles Becerra, jr.,	A.C.,	Caracas, Venezuela.
Maurice Clark Benedict,	M.E.,	Altoona.
Arthur Knode Birch,	E.E.,	Washington, D.C.
Frank Elliott Bradenbaugh,	M.E.,	Parkersburg, W.Va.
John Morgan Buckland,	Sci.,	Hokendauqua.
José Fernando Capriles,	C.E.,	Puerto Cabello, Venezuela.
Charles Ford Carman,	C.E.,	Cedarville, N.J.
David F. Castilla,	M.E.,	Coahuila, Mex.
Bernard Todd Converse,	M.E.,	Louisville, Ky.
John Peter Croll,	C.E.,	Trexlertown.
Rudolph Degener,	M.E.,	New York City.
George Armstrong Dornin,	M.E.,	Norfolk, Va.
Robert Farnham, jr.,	C.E.,	Washington, D.C.
José Maria Garza Galán, jr.,	E.M.,	Saltillo, Mex.
José Gervasio Gandia,	C.E.,	Tetuan, Porto Rico.
Eugene Gifford Grace,	E.E.,	Goshen, N.J.
John Wesley Grace, jr.,	E.E.,	Goshen, N.J.
William Gummere,	A.C.,	South Bethlehem.
Oscar Cooper Hannum,	C.E.,	Philadelphia.
George Duncan Heisey,	E.M.,	Pittsburg.
Paul Gerhard Ludiger Hilken,	M.E.,	Baltimore, Md.
George Augustus Horne,	A.C.,	Plainfield, N.J.
Roy Rhodes Hornor,	E.M.,	Clarksburg, W.Va.
George Reifsnyder Jackson,	C.E.,	Scranton.
Duncan Kennedy, jr.,	E.E.,	Detroit, Mich.
Edward Allen Keys,	C.E.,	Linden, Md.
Russell Kimball,	M.E.,	New York City.
Arthur Warner Klein,	M.E.,	Bethlehem.
Harry Edward Knight,	Sci.,	New York City.
Richard Skerrett Landron,	C.E.,	San Juan, Porto Rico.
George Craig Leidy,	C.E.,	Washington, D. C.
Frederick John Littell,	M.E.,	Erie.
George K. McGunnegle,	A.C.,	Meadville.
Owen Gray MacKnight,	E.E.,	Philadelphia.
Charles Michael Masson,	M.E.,	Rheims, N. Y.
William Lathrop Meaker,	A.C.,	Bethlehem.

	COURSE.	RESIDENCE.
James Flanders Middledith,	M.E.,	Plainfield, N. J.
J. Foster Morgan,	E.E.,	Harwood Mines.
Henry Ralph Palmer,	M.E.,	West Chester.
John Read Pettit,	E.M.,	Philadelphia.
Louis Thomas Rainey,	E.E.,	Decatur, Ill.
James Burr Reddig,	M.E.,	Shippensburg.
Percy Lesley Reed,	C.E.,	Altoona.
Victor Hugo Reid,	C.E.,	Brooklyn, N. Y.
George Loomis Robinson,	C.E.,	Elmira, N. Y.
Gustavo Rovelo,	M.E.,	Comitan-Chiapas, Mex.
Oliverio Sanchez,	C.E.,	Nuevitas, Cuba.
Henry Harger Scovil,	M.E.,	Copenhagen, N. Y.
Abraham Shimer,	M.E.,	West Bethlehem.
Robert Sargent Shriver,	Arch.,	Cumberland, Md.
William Harold Speirs,	Arch.,	St. Louis, Mo.
Abram Peters Steckel,	E.E.,	Lykens.
Robert Maximilian Straub,	C.E.,	Pittsburg.
William Frederick Ulrich,	A.C.,	Bethlehem.
John Sage Viehe,	E.E.,	Vincennes, Ind.
Theodore Cuyler Visscher,	C.E.,	Rome, N. Y.
Frederick Charles Wettlaufer,	A.C.,	New York City.
Harry Anderson Wilcox,	C.E.,	West Granby, Conn.
George Bassett Williams,	Arch.,	Washington, D. C.
George Herbert Wood,	M.E.,	Chambersburg.
William Bell Wood,	M.E.,	Baltimore, Md.

SOPHOMORE CLASS.

	COURSE.	RESIDENCE.
Louis Benjamin Abbott,	C.E.,	Carbondale.
George Kriebel Anders,	E.E.,	Cressman.
Arthur Benjamin Anderson,	Sci.,	Ambler.
George William Barager,	M.E.,	Hazleton.
Albert William Bayard,	M.E.,	Washington, D. C.
Berthold Graeff Beck,	E.E.,	West Bethlehem.
Thomas Francis Bell,	M.E.,	Shenandoah.
John Francis Benson,	C.E.,	Portsmouth, Va.

	COURSE.	RESIDENCE.
Edwin Percy Bigelow,	E.E.,	Oxford, N. J.
Marmion Stanley Black,	A.C.,	Swedesboro, N. J.
Russell Julian Borhek,	C.E.,	West Bethlehem.
Reginald Weller Bours,	C.E.,	Jacksonville, Fla.
John Hall Bower,	E.M.,	Myerstown.
Henry Lawton Bowers,	A.C.,	Rome, N. Y.
Andrew Thomas Brice,	E.E.,	New York City.
John James Brice,	C.E.,	New York City.
Joseph William Burke,	E.M.,	Shenandoah.
David Hastings Canfield,	Arch.,	Middletown, N. Y.
Robert William Canning,	M.E.,	South Bethlehem.
Morrow Chamberlain,	E.M.,	Chattanooga, Tenn.
Hugh Banks Chapman,	E.E.,	St. Elmo, Tenn.
Richard Cromwell Congdon,	M.E.,	Baltimore, Md.
Robert Milton Cortright,	A.C.,	Bethlehem.
George Curtis Coutant,	M.E.,	High Falls, N. Y.
George Hooper Day,	M.E.,	Batavia, N. Y.
John Kenelm Digby,	E.M.,	Paris, France.
Herbert Charles Dilliard,	C.E.,	East Bangor.
Alan Craig Dodson,	L.S.,	Bethlehem.
Truman Monroe Dodson, 2d,	Arch.,	Bethlehem.
Gavin Hogg Dortch,	M.E.,	Goldsboro, N. C.
William T. Drake,	M.E.,	Old Forge.
Nimson Eckert,	Clas.,	Allentown.
John William Fletcher,	M.E.,	Skowhegan, Me.
Theodore F. Forbes, jr.,	A.C.,	Fort McPherson, Ga.
Richard McNamee Freeman,	E.E.,	Andover, N. J.
John Fuller,	M.E.,	Quarryville, N. J.
Author Hendrix Gill,	M.E.,	Boring, Md.
James Henry Gledhill,	M.E.,	Riegelsville.
Herbert Terry Greene,	E.M.,	New York City.
Frederick Augustus Groff,	E.E.,	Rome, N. Y.
Charles Frederick Gross,	C.E.,	Belvidere, N. Y.
William B. Grubbe,	C.E.,	Pine Plains, N. Y.
Arthur Bradley Hanscom,	C.E.,	Philadelphia.
John George Heinz,	E.M.,	Louisville, Ky.
James Cuthbert Holderness,	E.E.,	Cambridge, Mass.

	COURSE.	RESIDENCE.
Albert Darby Hollingsworth,	Arch.,	Scotch Plains, N. J.
Michael James Honan,	E.E.,	Oxford, N. J.
Edward Melville Huggins,	M.E.,	Nevis, British W. I.
Harry Reese James,	M.E.,	Braddock.
William Edward Johnston,	E.M.,	Latrobe.
Elliott Bosworth Kitchell,	M.E.,	South Orange, N. J.
Paul Kline,	C.E.,	Pittsburg.
Clark Miles Knight,	M.E.,	Bethlehem.
Mason Benedict Lawton,	C.E.,	Rome, N. Y.
John Edward Leibfried,	A.C.,	Bethlehem.
Leroy Streeper Leopold,	M.E.,	Pottstown.
William Grant Lessig,	M.E.,	Shenandoah.
Herbert Spencer Lewis,	C.E.,	Baltimore, Md.
Thomas Windle Lukens,	E.M.,	Atglen.
Charles Edward Terry Lull,	E.M.,	Trenton, N. J.
William Thomas McCarthy,	Arch.,	Rome, N. Y.
Kenneth Wesley McComas,	A.C.,	South Bethlehem.
David Graham McGavock,	E.M.,	Graham's Forge, Va.
William George McVey,	C.E.,	South Bethlehem.
Carl Edward Maeder,	M.E.,	Pittsburg.
Harry Ivins Magee,	C.E.,	Philadelphia.
William Elston Magie,	M.E.,	New York City.
Joseph Patrick Martin,	C.E.,	Plymouth.
J. Louis Meixell,	E.E.,	Parsons, Kan.
Harry Maxwell Menner,	A.C.,	Bethlehem.
Robert Hopkins Moffitt, jr.,	E.M.,	Harrisburg.
Manuel de la Mora,	C.E.,	Guadalajara, Mex.
Robert C. Morris, jr.,	M.E.,	Pottsville.
George Rohrer Morrow,	E.M.,	Highspire.
Louis Ortner,	M.E.,	Drifton.
Arthur Rose Parsons,	E.M.,	Salt Lake City, Utah.
Frederick Jay Payne,	M.E.,	Copenhagen, N. Y.
John Hazelrod Pomeroy,	M.E.,	Ridley Park.
Norman Spearman Powell,	E.M.,	West Middlesex.
Joseph Jacob Reamer,	C.E.,	Waterloo, N. Y.
John Nicholas Reese,	C.E.,	Harrisburg.
Alexander Duffield Robb,	A.C.,	Phœnixville.

	COURSE.	RESIDENCE.
Walter Henry Rodney,	C.E.,	Baltimore, Md.
Ferdinand W. Roebling, jr.,	M.E.,	Trenton, N. J.
James George Ross,	C.E.,	Kittanning.
Charles Edward Rowe,	M.E.,	Philadelphia.
Armando Sanchez,	E.M.,	Nuevitas, Cuba.
Alfredo J. Sanchez,	A.C.,	Matanzas, Cuba.
Edmund Trowbridge Satchell,	A.C.,	Lancaster.
Martin Schwerin,	E.M.	New York City.
Harvey Simon Seiple,	M.E.,	Bethlehem.
Joseph Stauffer Shultz,	C.E.,	Washington Boro.
Clayton Miller Simmers,	C.E.,	Phœnixville.
Charles Sylvanus Snyder,	M.E.,	South Bethlehem.
Arturo Solórzano,	M.E.,	Managua, Nicaragua.
William Paul Starkey,	M.E.,	Bustleton.
Herbert Spencer Stauffer,	C.E.,	South Bethlehem.
John Alvin Strauss,	E.E.,	Sayre.
William Wharton Thurston,	E.M.,	South Bethlehem.
Henry Adolph Tobelmann,	E.M.,	Basking Ridge, N. J.
John Ralph VanDuyne,	C.E.,	Newark, N. J.
William Penn White,	E.E.,	Washington, D. C.
William Townsend White,	Arch.,	Williamsport.
Toros Kurk Yasharian,	E.E.,	Hedjin, Armenia.
Edward Abraham Yellis,	Sci.,	Weaversville.
Edward Robins Zalinski,	E.M.,	New York City.

FRESHMAN CLASS.

	COURSE.	RESIDENCE.
Samuel R. Alder,	E.M.,	Redlands, Cal.
John Ernest Allen,	Clas.,	Bethlehem.
Louis Maxson Allyn,	A.C.,	Mystic, Conn.
Paul Lewis Anderson,	E.E.,	Somerville, N. J.
Joaquim Gregoriano de Andrade,	M.E.,	Obidos, Brazil.
Frederic Arthur Armstrong,	E.E.,	Brooklyn, N. Y.
Charles Elmer Barba,	M.E.,	South Bethlehem.
Robert Ernest Baum,	M.E.,	Bethlehem.
Charles Insley Berlin,	M.E.,	Bath.

	COURSE.	RESIDENCE.
Walter Harry Blocksidge,	A.C.,	Pulaski City, Va.
Charles Rand Bolles,	M.E.,	Hartford, Conn.
Richard Boone,	M.E.,	South Bethlehem.
Newton Wayne Buch,	A.C.,	Lancaster.
Ernest Francis Burchard,	E.M.,	Evanston, Ill.
Henry Duncan Burnet,	Clas.,	Cincinnati, O.
Louis Philip Butler,	M.E.,	Croton Falls, N. Y.
Frederick L. Campbell,	C.E.,	Slatington.
Albert A. Canning,	E.M.,	South Bethlehem.
James Hamilton Chickering,	M.E.,	Oil City.
David Bean Clark,	Clas.,	Richlandtown.
Russell Miner Clark,	E.E.,	Bradford.
John Henry Crane,	E.M.,	Chicago, Ill.
William Albert Ehlers,	M.E.,	Hernwood, Md.
David Dorrance Elder,	C.E.,	Elizabethville.
Paul Thomas Ellenbogen,	A.C.,	Allentown.
Charles Albion Emerson,	E.E.,	Summerville, S. C.
Charles Enzian,	C.E.,	Weissport.
Cadwallader Evans, jr.,	M.E.,	Pittsburg.
Carl Watson Evans,	E.E.,	Great Falls, Mont.
William Maxville Felsinger,	E.E.,	Northumberland.
Edward Morse Field,	E.M.,	Montclair, N. J.
John Henry Flory,	E.E.,	Ashley.
Ernesto Franco,	C.E.,	Quito, Ecuador.
Gottlieb L. Freudenberger,	C.E.,	Tamaqua.
Lewis Alfred Freudenberger,	E.E.,	West Bethlehem.
Josef Blackburn Freund,	E.E.,	Washington, D. C.
Cástulo Gallardo,	C.E.,	Guadalajara, Mexico.
Cástulo Martinez Gallardo,	C.E.,	Guadalajara, Mexico
Morris W. Garman,	E.M.,	Nanticoke.
Frank Benjamin Gearhart,	A.C.,	Altoona.
William Mahlon Gilbert,	E.E.,	Lo Lo, Mont.
Thomas Mercer Girdler,	M.E.,	Jeffersonville, Ind.
Percy Lamar Grubb,	Clas.,	Harrisburg.
Webster Neugard Haas,	C.E.,	Hepler.
Samuel Thomas Harleman,	M.E.,	South Bethlehem.
Ellwood Scott Harrar,	E.E.,	Allentown.

	COURSE.	RESIDENCE.
Frederick Apple Hausman,	Arch.,	Allentown.
Samuel Parke Heitshu,	M.E.,	Lancaster.
Austin Diehl Heller,	L.S.,	Hellertown.
Edwin Higgins, jr.,	E.M.,	Washington, D. C.
Lloyd Jones Iredell,	Sci.,	Allentown.
Webster Thomas James,	E.M.,	Chattanooga, Tenn.
Edmund Percival Jump,	M.E.,	Easton, Md.
George M. Kennedy,	E.E.,	Pottsville.
Farley Kimball,	M.E.,	New York City.
Louis G. Krause,	M.E.,	Absecon, N. J.
John S. Krauss,	E.E.,	East Greenville.
Samuel Townsend Laubach,	M.E.,	Northampton.
Albert R. Laubenstein,	E.E.,	Ashland.
Adriano T. Lopez,	E.E.,	San Juan, Porto Rico.
Joseph Emanuel McCarthy,	M.E.,	South Bethlehem.
Charles Joseph McGonigle,	C.E.,	Allentown.
George Alexander MacLean,	C.E.,	Bethlehem.
Albert Winfred Mans,	C.E.,	Hazleton.
C. Martinez y Rengifo,	C.E.,	Tampa, Fla.
Luther D. Menough,	C.E.,	York.
Henry Jarvis Moore,	E.M.,	Gill, Mass.
Edward Thomas Murphy,	M.E.,	Brooklyn, N. Y.
Elmer Fellman Musselman,	M.E.,	Middletown.
Harvey S. Musselman,	M.E.,	Steinsburg.
John J. Nolan,	M.E.,	Carbondale.
Harry Edward Packer,	M.E.,	South Bethlehem.
Everett J. Peck,	M.E.,	Plainfield, N. J.
Raymond Thomas Peppell,	M.E.,	Allentown.
Antonio F. de C. Pinheiro,	E.E.,	Pará, Brazil.
John Vincent Rittenhouse,	E.M.,	Plainfield, N. J.
William Perry Rogers,	M.E.,	Latrobe.
Branch Elliott Russell,	C.E.,	Portage, Wis.
James C. Ryan,	E.E.,	Harrisburg.
Albert Clinton Savidge,	E.E.,	Sunbury.
Carlos Nathaniel Scovil,	M.E.,	Copenhagen, N. Y.
John Wallace Shaeffer,	M.E.,	Fleetwood.
Newton Melman Shaffer,	Arch.,	New York City.

	COURSE.	RESIDENCE.
John J. Shonk, jr.,	C.E.,	Plymouth.
Myles Standish Smith,	M.E.,	Mishawaka, Ind.
Constantine Lee Straub,	E.E.,	Bethlehem.
Herman Arnold Straub,	C.E.,	Pittsburg.
Charl esMeredith Strawn,	E.E.,	Quakertown.
John Fife Symington,	M.E.,	Baltimore, Md.
Horace A. Taveira,	E.E.,	Havana, Cuba.
Richard Ferrier Taylor,	E.M.,	Bethlehem.
Edward T. Thornton,	E.M.,	Philadelphia.
Grandison G. Underhill,	C.E.,	East Aurora, N. Y.
James Strawbridge Van Alen,	E.E.,	Northumberland.
Joseph Benjamin Varela,	E.E.,	Bethlehem.
Frederick Dana Viehe,	A.C.,	Vincennes, Ind.
Bertil Von Philp,	M.E.,	Bethlehem.
George William Welsh,	E.E.,	Hanover.
John Whitridge,	C.E.,	Baltimore, Md.
Edwin Benton Wilkinson,	A.C.,	Williamsport.
Henry Dalzell Wilson,	M.E.,	Pittsburg.
Robert Augustus Wright,	Sci.,	Allentown.
Thomas Wilbraham Wright,	E.M.,	Philadelphia.
Arthur Reuben Young,	C.E.,	West Bethlehem.

SPECIAL STUDENTS.

	COURSE.	RESIDENCE.
David Maurice Barry,	E.M.,	Agawam, Mass.
Alexander T. Johnson,	E.M.,	Towanda.
Edgar Price,	E.E.,	Berryville, Va.
Walter S. Smith,	E.M.,	Forty Fort.
Harry Wellington Thatcher,	A.C.,	South Bethlehem.

SUMMARY OF STUDENTS BY STATES.

Maine,	1
Massachusetts,	5
Connecticut,	5
New York,	35
New Jersey,	30
Pennsylvania,	183
Delaware,	1
Maryland,	16
District of Columbia,	11
Virginia,	7
West Virginia,	3
North Carolina,	2
South Carolina,	3
Georgia,	1
Florida,	2
Kentucky,	3
Tennessee,	3
Ohio,	1
Indiana,	5
Illinois,	4
Michigan,	2
Wisconsin,	1
Iowa,	1
Missouri,	1
Kansas,	1
Colorado,	1
Utah,	2
Montana,	3
California,	1
Mexico,	8

Cuba,	6
Porto Rico,	3
British West Indies,	1
Nicaragua,	1
Republic of Colombia,	1
Venezuela,	2
Brazil,	2
Ecuador,	1
France,	1
Holland,	1
Macedonia,	1
Armenia,	1
	363

SUMMARY OF STUDENTS BY CLASSES AND COURSES.

	Graduates.	Seniors.	Juniors.	Sophomores.	Freshmen.	Specials.	Totals.
Classical,	4	4	—	1	4	—	13
Latin-Scientific,	—	—	—	1	1	—	2
Science and Letters,	2	—	2	2	2	—	8
Civil Engineering,	4	19	18	24	19	—	84
Mechanical Eng.,	1	23	19	31	32	—	106
Mining Eng.,	4	3	4	19	13	3	46
Electrical Eng.,	3	15	10	13	24	1	66
Analytical Chem.,	—	3	7	10	7	1	28
Architecture,	—	—	3	5	2	—	10
Totals,	18	67		106	104	5	363

ALUMNI

OF THE

LEHIGH UNIVERSITY.

CLASS OF 1869.

*J. Haynes Hinds Corbin, A.C.

Miles Rock, C.E., Astronomer, Chief Engineer, and President of the Boundary Commission of Guatemala with Mexico, Guatemala City, Central America.

Charles Edward Ronaldson, M.E., Zeta Psi Club, 148 W. 34th Street, New York City; 4017 Locust Street, Philadelphia, Pa.

CLASS OF 1870.

*Lehman Preston Ashmead, A.C., M.D.,

Richard Brodhead, M.E., Attorney-at-Law, 32 Nassau Street, New York City.

William R. Butler, M.E., Manufacturer, Mauch Chunk, Pa.

George A. Jenkins, A.C., Bethlehem Iron Co., South Bethlehem, Pa.

William J. Kerr, A.C., M.E., Supt. Motive Power, Union Traction Co., Thirteenth and Mount Vernon Streets, Philadelphia, Pa. Residence: 1010 South 49th Street.

*Harry E. Packer, A.C.

Henry R. Price, C.E., M.D., Practicing Physician, 485 Franklin Avenue, Brooklyn, N. Y.

Henry B. Reed, B.A., M.D., Practicing Physician, 545 Franklin Avenue, Brooklyn, N. Y.

*William Dunlop Ronaldson, B.A., M.D.

*Deceased.

John M. Thome, C.E., Ph.D., Director National Astronomical Observatory, Cordova, Argentine Republic S. A.

*Russel B. Yates, C.E.

CLASS OF 1871.

Jacob Neff Barr, M.E., Superintendent Motive Power, Chicago, Milwaukee & St. Paul Ry., 3028 Wells Street, Milwaukee, Wis.

Frank Laurent Clerc, C.E., Mining, Philipsburg, Pa.

Henry S. Drinker, E.M., Lawyer; General Solicitor of the Lehigh Valley Railroad Co., 228 South Third Street, Philadelphia, Pa. Vice-President East Jersey Water Co., 2 Wall Street, New York City. Residence and mailing address: Haverford, Pa.

Edward F. Fassitt, A.C., 153 East Washington Lane, Germantown, Pa.

William Hull MacCarthy, B.A., Secretary of the White Mfg. Co., Globe Iron Works, 556 West 34th Street, New York City.

Waldron Shapleigh, A.C., Chemist, Welsbach Light Company, Gloucester City, N. J. Residence: 2223 Trinity Place, Philadelphia, Pa.

*Charles G. Weaver, C.E.

CLASS OF 1872.

George Pierrepont Bland, C.E., Civil Engineer. Residence: 3220 Woodland Avenue, Philadelphia, Pa.

Daniel P. Bruner, C.E., Civil Engineer, Architect, and Builder, 501 W. Chelten Ave., Germantown, Philadelphia, Pa.

Henry St. Leger Coppée, C.E., U.S. Assistant Engineer, Greenville, Miss.

*F. R. Christian Degenhart, A.C.

Harvey S. Houskeeper, B.A., Principal of State Academy, Brookeville, Md.

*Lentz Edmund Klotz, C.E.

*Deceased.

Oscar Moore Lance, A.C., General Manager, Spring Brook Water Supply Co., Wilkes-Barre, Pa.

Raymundo Floresta de Miranda, M.E., Division Engineer, Rio de Janeiro and Northern R. R. Address: E. F. Principe de Grao Pará, Estaçaodo Areal, Rio de Janeiro, Brazil.

James S. Polhemus, C.E., Assistant U. S. Engineer, in local charge Coos Bay Harbor Improvements, Empire, Oregon.

Henry D. Scudder, C.E., Lumber and Coal, 344 Perry Street, Trenton, N. J.

CLASS OF 1873.

Washington Hopkins Baker, A.C., M.D., Physician and Life Insurance Examiner, 1610 Summer Street, Philadelphia, Pa.

Robert B. Claxton, C.E., 5116 Newhall Street, Germantown, or University Club, Philadelphia, Pa.

James Peyton Stuart Lawrance, M.E., Chief Engineer U. S. Navy, care of Navy Department, Washington, D. C.

Hildebrando Barjona de Miranda, A.C., Professor of English, Lyceo Paraence, Belém do Pará, Estades Unidos do Brazil.

Wallace McIlvaine Scudder, M.E., Publisher Newark *Evening News*, 215 Market Street, Newark, N. J. Residence: 10 Washington Place.

CLASS OF 1874.

Caspar Wistar Haines, A.M. (Haverford '72), C.E., of the firm of Silva y Haines, Engineers and Contractors, Puebla, Mexico.

William Davis Hartshorne, C.E., Superintendent Worsted Department, Arlington Mills, Lawrence, Mass. Residence: 40 Pleasant Street, Methuen, Mass.

Allen A. Herr, C.E., Civil Engineer and Real Estate Agent, 108 East King Street, Lancaster, Pa.

Thomas Merritt, C.E., Manager Mutual Life Insurance Co. of New York, 31–32–33 Canadian Bank of Commerce Building, Toronto, Can.

William Marshall Rees, C.E., First Assistant Engineer, Mississippi River Improvement, Appeal Building, Memphis, Tenn.

CLASS OF 1875.

Charles Julius Bechdolt, C.E., Superintendent Central Division, P., W. & B. R. R., Media, Pa.

Antonio M. Cañadas, A.C., Chemist, Loja, Ecuador.

John F. Halbach, B.A., B. M., Attorney-at-Law, 1218–1220 Filbert Street, Philadelphia, Pa.

William Arthur Lathrop, C.E., General Superintendent Lehigh Valley Coal Co., Wilkes-barre, Pa.

Arthur E. Meaker, C.E., Assistant Professor of Mathematics, Lehigh University. Residence: 542 North Street, Bethlehem, Pa.

Joseph Morrison, C.E., Resident Engineer for Lines west of the Mississippi River, The Wabash Railroad Co. Residence: 401 South Clark Street, Moberly, Mo.

Francis Sebastian Pecke, C.E., Chief Engineer, G. & G. N. Railway, New York City. Residence: 138 Franklyn Place, Flushing, N. Y.

Edward H. Williams, Jr., B.A. (Yale), A.C., E.M. ('76), F.G.S.A., Professor of Mining and Geology, Lehigh University. Residence: 117 Church Street, Bethlehem, Pa.

* Carl F. Zogbaum, C.E.

CLASS OF 1876.

Frank C. Angle, C.E., Attorney-at-Law, Danville, Montour Co., Pa.

* James DeWitt Carson, C.E.

* Thomas William Frederick, M.E.

William Griffith, C.E., Mining Engineer and Coal Specialist, Coal Exchange, Scranton, Pa. Residence: 405 Susquehanna Avenue, West Pittston, Pa.

* Deceased.

C. William Macfarlane, C.E., Ph.D. (Freiberg i. B. '93), Narberth, Pa.

Robert W. Mahon, C.E., Ph.D. (Johns Hopkins), Monongahela Furnace Co., McKeesport, Pa.

J. J. de Gama Malcher, M.E.

Walter Percival Rice, C.E., Civil Engineer, The Walter P. Rice Engineering Co., 545 Society for Savings Building, Cleveland, Ohio. Residence: 293 Euclid Avenue.

Henry Richards, E.M., Contractor, Dover, N.J.

Lowdon W. Richards, M.E., Columbia, Pa.

Charles L. Taylor, E.M., Assistant to President, The Carnegie Co., Limited, Carnegie Building, Pittsburg, Pa.

CLASS OF 1877.

John Eagley, C.E., North Springfield, Erie Co., Pa.

Percival D. Giess, C.E., Bethlehem, Pa.

Andrew M. Glassel, C.E., Bowling Green, Va.

George M. Heller, C.E., Bridge Engineer, 853 North 20th Street, Philadelphia, Pa.

Henry Sylvester Jacoby, C.E., Associate Professor of Bridge Engineering and Graphics, Cornell University. Residence: 7 Reservoir Avenue, Ithaca, N. Y.

James Fremont Marsteller, C.E., Superintendent, Snow Shoe Division, Lehigh Valley Coal Co., Snow Shoe, Centre Co., Pa.

*Seizo Miyahara, C.E.

Charles R. Rauch, A.C., Central Hotel, Bethlehem, Pa.

Lewis Theodore Wolle, C.E., Secretary of the Cambria Mining Co., Cambria, Weston Co., Wyoming.

CLASS OF 1878.

Charles Bull, M.E., Assistant Librarian and Bursar, General Theological Seminary, Chelsea Square, New York City.

*James E. Gilbert, C.E.

William Convers Hazlett, M.E., Architect, 151 Broadway, New York City.

*Deceased.

Frank Perley Howe, B.A. (Brown), E.M., President, The North Branch Steel Co.; Vice-President, Wm. Wharton, jr., & Co., Inc. Residence: 251 South 17th Street, Philadelphia, Pa.

Nathaniel Lafon, M.E., Engineer for Jellico & Bird Eye Coal Co., Halsey, Whitley Co., Ky.

Benjamin B. Nostrand, jr., M.E., Electrical Engineer, The Westinghouse Electric and Manufacturing Co.; Treasurer and Manager, The Sing Sing Electric Lighting Co.; President and Treasurer, The Peekskill Electric Light and Power Co., Peekskill, N. Y.

Milnor Peck Paret, C.E., Resident Engineer, Kansas City, Pittsburg & Gulf R. R., Lake Charles, La.

Holbrook Fitz John Porter, M.E., General Western Sales Agent for the Bethlehem Iron Co., Room 1433 Marquette Building, Chicago, Ill. Residence: 4214 Berkeley Avenue.

William K. Randolph, C.E.

Robert H. Read, B.A., Successor to Pope, Read and Rogers, Patent Attorneys, 44 Broad Street, New York City.

Henry Church Wilson, C.E., Chief Clerk, U. S. Engineer Office, Room C 8, Army Building, New York City.

CLASS OF 1879.

James S. Cunningham, M.E., Chief Engineer, Berwind-White Coal Mining Co., Tyrone, Pa.

*Joseph Hill Paddock, M.E.

Fitz William Sargent, C.E., General Agent The Sargent Co., 675 Old Colony Building, Chicago, Ill. Residence: The Irving, 308 N. State Street.

Richard Hawley Tucker, C.E., Astronomer, Lick Observatory, Mt. Hamilton, Cal.

CLASS OF 1880.

Abraham Bruner, E.M., Civil Engineer, Assistant Engineer, Norfolk & Western R.R., Crewe, Nottoway Co., Va.

*Deceased.

Murray Morris Duncan, A.C., E.M. ('80), Agent Cleveland-Cliffs Iron Company, Ishpeming, Michigan.

Thomas Hughlett Hardcastle, B.A., M.A. ('82), LL.B., Attorney-at-Law, 601 Boston Building, Denver, Col. Residence: 950 Pearl Street.

John Tinsley Jeter, E.M., Superintendent of the Keystone Coal Co., Wilkes-Barre, Pa. Residence: 222 S. Franklin Street.

Charles Francis King, A.C.

George Ernest Potter, C.E., Assistant Engineer, New York, Chicago & St. Louis R. R., 151 Wayne Street, Fort Wayne, Ind.

Frederick Putnam Spalding, C.E., Assistant Professor of Civil Engineering, Cornell University, Ithaca, N. Y. Residence: 159 E. Seneca Street.

Leonard Blakeslee Treharne, B.A., Editorial Department, *New York Times*, New York City.

Benjamin Russell Van Kirk, M.E., Locomotive Designer, Baldwin Locomotive Works, 2105 Green Street, Philadelphia, Pa.

* Frederick Copeland Wooten, M.E.

CLASS OF 1881.

William Simon Cranz, A.C., Purchasing and Development of Mining Property, Nogales, Arizona.

Alexander Patrick Crilly, B.A., Allentown, Pa.

Thomas Morgan Eynon, M.E., General Manager, The Eynon-Evans Mfg. Co., 15th and Clearfield Streets, Philadelphia, Pa. Residence: 3102 N. Fifteenth Street.

Charles Weed Gray, A.C.

Benjamin Franklin Haldeman, E.M., Superintendent, Bessemer Department, Cambria Iron Co., Johnstown, Pa. Residence: Fayette Street, Westmont, Johnstown.

Lewis Stockton, B.A., Counselor-at-Law, Erie Bank Building, Cor. Niagara and Main Streets, Buffalo, N. Y. Residence: Cor. North and Franklin Streets.

* Deceased.

CLASS OF 1882.

Louis Oscar Emmerich, E.M., Mining Engineer, Hazleton, Pa.

Charles Comstock Hopkins, B.S. (Sci.), C.E. ('84), member of firm of The Stanwix Engineering Co., Hydraulic and Sanitary Engineers, Rome, N. Y.

Elmer Henry Lawall, C.E., General Superintendent Lehigh & Wilkes-Barre Coal Co., Wilkes-Barre, Pa. Residence: 133 S. Franklin Street.

Robert Thomas Morrow, C.E., Assistant Engineer, Elmira and Canandaigua Divisions, N. C. Ry., Elmira, N. Y. Residence: 702 Park Place.

Eugene Ricksecker, C.E., U. S. Assistant Engineer in local charge of fortification work, Marrowstone Point, Seattle, Washington.

John Dougherty Ruff, E.M., 328 South 21st Street, Philadelphia, Pa.

* Samuel Brenton Sickler, C.E.

Martin Wittmer, E.M., Superintendent Wittmer Brick Co., Limited, Glen Shaw, Allegheny Co., Pa.

CLASS OF 1883.

* Enos Kellar Bachman, E.M.

Walter Briggs, B.A., Attorney-at-Law, Board of Trade Building, Scranton, Pa. Residence: 1505 Adams Avenue.

Henry Augustus Butler, B.S. (Sci.), Secretary and Treasurer, Carbon Iron and Steel Co., Limited, Mauch Chunk, Pa.

Hedley Vicars Cooke, B.A., LL.M. (Columbian University), Attorney-at-Law, Union Trust Building, 707 Olive Street, St. Louis, Mo. Residence: Normandy, Mo.

Francis Joseph Crilly, B.A., M.A. ('89), Special Deputy Collector of the Port, Custom House, Philadelphia. Residence: 1926 Spring Garden Street.

Francis Wharton Dalrymple, C.E., City Engineer, 131 Main Street, Hornellsville, N. Y.

* Deceased.

Timothy James Donahoe, A.C., Benson Mines, N. Y.

George Francis Duck, E.M., General Sales Agent, Port Royal C. & C. Co., 1218 Park Building, Pittsburg, Pa.

Alfred Edmond Forstall, M.E., General Manager Montclair Gas and Water Co., Montclair, N. J. Residence: 559 Bloomfield Avenue.

Nathaniel Oliver Goldsmith, M.E., Principal Engineer, The Weir Frog Co.; Vice-President, The We-Fu-Go Co.; Treasurer, The American Coke Drawer Co., Cincinnati. O. Residence: Glendale, O.

William Theodore Goodnow, C.E., General Manager Cayuta Wheel and Foundry Co., and The Sayre Land and Water Co., Sayre, Pa.

John Daniel Hoffman, B.A., M.A. ('89), Counselor-at-Law, 17 Broad Street, Bethlehem, Pa. Residence: 30 N. Main Street.

George Gowen Hood, C.E., Civil Engineer, Mount Airy, Philadelphia, Pa.

Garrett Linderman Hoppes, C.E., Eagle Hotel, Bethlehem, Pa.

Julian de Bruyn Kops, B.E. (University of Georgia), C.E., Assistant City Engineer, Savannah, Ga.

Preston Albert Lambert, B.A., M.A. ('91), Assistant Professor of Mathematics, Lehigh University, South Bethlehem, Pa.

Edwin Francis Miller, M.E., with R. D. Wood & Co., Camden, N. J.

Rev. Wilson Franklin More, B.A., M.A. ('91), Pastor Salem Reformed Church, Catasauqua, Pa.

Nelson Morrow, M.E., Manager of the Deep Rock Mineral Springs, Oswego, N. Y. Residence: 235 West First Street.

Thomas Nicholson, M.E., with the Johnstown R. R. Frog and Switch Co., Chester, Pa.

George Spencer Patterson, E.M., Mining and Civil Engineer, Box 131, Terre Haute, Ind. Residence: 521 Ohio Street.

Rembrandt Richard Peale, B.S. (Sci.), Secretary and Treasurer, Bloomington Mining Co., 411–413 Walnut Street, Philadelphia, Pa.

Henry Allebach Porterfield, E.M., President and General Manager, The Dexter Spring and Gear Co., Inc., Pittsburg, Pa. Residence: 319 S. Hiland Avenue, E.E.

Francis Henry Purnell, C.E., E.M. ('86), Clerk of the Circuit Court, Worcester Co., Snow Hill, Md.

Jesse Wilford Reno, E.M., Rapid Transit Tunnel for New York City; The Reno Inclined Elevator Co.; Mining Expert, Mills Building, New York City.

Charles Loomis Rogers, M.E., General Manager, Milton Car Works, Milton, Pa.

John Ruddle, M.E., General Supervisor, Canal Department, The Lehigh Coal and Navigation Co., Mauch Chunk, Pa.

Charles Henry Stinson, B.S. (Sci.), Attorney-at-Law, Norristown, Pa.

*Robert Stinson, B.S. (Sci.).

CLASS OF 1884.

Robert Grier Cooke, B.A., Journalist, with Harper & Brothers, Franklin Square, New York City. Residence: 55 West 36th St.

Henry Bowman Douglas, B.M., E.M. ('85), Consulting Mining Engineer, Vinton Colliery Co., Vintondale, Cambria Co., Pa.

William Banks Foote, B.M., E.M. ('86), Etiwanda, San Bernardino Co., Cal.

Harry Tallman Harper, C.E., Assistant Engineer, Florence & Cripple Creek Railroad, Florence, Col.

Harry Hurd Hillegass, C.E., Civil Engineer, Reading, Pa.

Edwin Franklin Hofford, C.E., Lehighton, Pa.

John Andrew Jardine, B.M., E.M. ('85), with Pilling & Crane, Girard Building, Philadelphia, Pa. Mailing Address: Kenvil, Morris Co., N.J.

* Deceased.

James Warner Kellogg, M.E., Manager of Isolated and Marine Sales, General Electric Co., Schenectady, N.Y.

David Garrett Kerr, B.M., Edgar Thomson Steel Works, Wilkinsburg, Pa.

Frederick Bowman Langston, C.E., Architect, 1239 Bedford Avenue, Brooklyn, N.Y.

William Langston, C.E., with Dean & Westbrook, Bridge Engineers and Contractors, 136 Liberty Street, New York City.

Robert Packer Linderman, Ph.B., President of the Bethlehem Iron Company; President of the Lehigh Valley National Bank. Residence: South Bethlehem, Pa.

Joseph Franklin Merkle, C.E. M.D. (Univ. of Pa. '94), Physician and Surgeon, Llewellyn, Pa.

Harry Krider Myers, C.E., general engineering, 3653 North 15th Street, Philadelphia, Pa.

Albino Rosendo Nuncio, M.E., 3d Officer of the Section of Agriculture and Patents of the Secretary of Fomento, City of Mexico, Mexico.

James Ward Packard, M.E., President, The Packard Electric Co., Manufacturers, Warren, O.

Alfred Scull Reeves, B.M., E.M. ('85), of the firm of Paul S. Reeves & Son, Manufacturers of Phosphor Bronze, Brass, Babbitt Metals, etc., 1415–1425 Catharine Street, Philadelphia, Pa. Residence: 21st Street and Delancey Place.

Barry Searle, A.C., Superintendent Deep Crown Gold Mine, Johannesburg, South African Republic. Permanent address: care of R. S. Searle, Montrose, Pa.

Lewis Buckley Semple, B.A., M.A. ('91), Ph.D. (Princeton), Instructor in English, Lehigh University.

Augustus Parker Smith, M.E., LL.B. (Georgetown Univ.), Counselor-at-Law; specialty, Patent and Copyright Cases; 45 Broadway, New York City. Residence: 336 West 55th Street.

Murray Stewart, M.E., Motive-Power Department, Philadelphia, Wilmington & Baltimore R. R. Co., Wilmington, Del.

Richard Washington Walker, C.E., Glen Moore, Pa.

James Angus Watson, C.E., Patent Lawyer, 931 F Street, N. W., Washington, D. C. Residence: 1454 Howard Avenue.

CLASS OF 1885.

Warren Howard Allen, A.C., Clerk, Farmers' National Bank, Athens, Pa.

Harrison Link Auchmuty, C.E., Assistant Chief Engineer, H. C. Frick Coke Co., Loucks Avenue, Scottdale, Pa.

*Theodore Weld Birney, C.E.

Harry Luther Bowman, B.M., care of Y. M. C. A., Harrisburg, Pa.

William Harvey Cooke, B.A., M.D., 10 N. Munn Avenue, East Orange, N. J.

William Noble Edson, C.E., of the firm of Edson Brothers, General Contractors, Phelps, N. Y.

*John Roberts Engelbert, C.E.

Felix Freyhold, C. E., Draughtsman, Bureau of Yards and Docks, Room 166, Navy Department, Washington, D. C. Residence: 236 First Street, S.E.

Irving Andrew Heikes, B.M., E.M. ('86), Superintendent of Schools, Plymouth, Pa.

David Kirk Nicholson, M.E., with the Carnegie Steel Co., Limited, Braddock, Pa.

*Fayette Brown Petersen, C.E.

John Bertsch Price, C.E., Cashier, First National Bank, Hazleton, Pa.

Harry William Rowley, M.E., Chief Draughtsman, The Dickson Manufacturing Co., Scranton, Pa. Residence: 411 Madison Avenue.

*Elliot Otis Smith, C.E.

Clarence Moncure Tolman, M.E., Mechanical and Electrical Engineer, with Edward G. Stoiber, Silver Lake Mines, Silverton, Col.

John R. Wagner, M.E., Superintendent of Motive Power, Delaware, Susquehanna & Schuylkill R. R.; Superintendent of Motive Power and Machinery of the Coxe

* Deceased.

Iron Mfg. Co., and the Cross Creek Coal Co. Residence: Drifton, Luzerne County, Pa.

James Hollis Wells, C.E., Civil Engineer, with Clinton & Russell, Architects, 32 Nassau Street, New York City.

Cabell Whitehead, B.M., M.S. (Columbian University), Assayer, Bureau of the Mint, Treasury Department, Washington, D. C. Residence: 1114 New Hampshire Avenue.

CLASS OF 1886.

George Rodney Booth, Ph.B., Attorney-at-Law, Cor. Brodhead Avenue and Fourth street, South Bethlehem, Pa. Residence: 410 Market Street, Bethlehem, Pa.

Richard Singmaster Breinig, B.S., E.M. ('89), Engineer Department, Kansas Division, Union Pacific Ry., 12th and Liberty Streets, Kansas City, Mo. Residence: 1600 Park Avenue.

John Henry Brown, C.E., 1176 Washington Boulevard, Chicago, Ill.

Charles Ellsworth Clapp, Ph.B., Attorney-at-Law, 837 New York Life Building, Omaha, Neb.

George Henry Cobb, M.E., Chief Engineer, New York Transit Co., Metzger Building, Elmira, N. Y. Residence: 313 College Avenue.

William Henry Dean, B.M., E.M. ('86), A.C. ('86), Analytical Chemist, and Professor of Chemistry, Harry Hillman Academy, 89 West River Street, Wilkes-Barre, Pa.

Frederick William Fink, C.E., of the firm of Gibson & Fink, Civil and Mining Engineers, U. S. Deputy Mineral Surveyors, 303 Carr Avenue, Cripple Creek, Col.

Robert Caldwell Gotwald, C.E., Civil Engineer and Architect, Springfield, O.

Lewis John Henry Grossart, C.E., Civil Engineer, with the Atlas Cement Co., Northampton, Pa. Residence: 513 Allen Street, Allentown.

Max S. Hanauer, A.C., Manager Union Assay Office 152 S. W. Temple Street, Salt Lake City, Utah. Residence: 1111 E. First South Street.

Solomon Jacob Harwi, C.E., Assistant Engineer, Marine Department, The Babcock and Wilcox Co., New York City. Residence: 38 West 33d Street, Bayonne, N. J.

Simeon Cole Hazelton, B.M., E.M. ('87), Assistant Superintendent, Germania Lead Works, Murray, Utah.

Mark Antony De Wolfe Howe, jr., B.A., A.B. and A.M. (Harvard), Bristol, R. I.

Charles Alexander Junken, C.E., Computer on Gun Construction, Ordnance Office, War Department, Washington, D. C. Residence: 435 New Jersey Avenue, S. E.

Guadalupe Lopez de Lara, M.E., Principal in the Lopez de Lara Iron Works Co., Guadalajara, Jalisco, Mexico. Residence: Avenida Alcalde No. 8.

Charles Augustus Luckenbach, B.M., Purchasing Agent for The Los Angeles Lighting Co. and the Los Angeles Electric Co., 457 Broadway, Los Angeles, Cal. Residence: 1266 Ionia Street.

William Anthony Lydon, B.M., E.M ('87), President Lydon & Drews Co., Engineers and Contractors, 1441 Unity Building, 79 Dearborn Street, Chicago, Ill. Residence: 2952 Indiana Avenue.

Paul Douglass Millholland, C.E., with J. H. Sternbergh & Son, (Bolts, Nuts, etc.), Reading, Pa. Residence: 415 Spring Street.

Henry Gerber Reist, M.E., Mechanical and Electrical Engineer, with General Electric Co., Schenectady, N. Y. Residence: 5 South Church Street.

Joseph William Richards, A.C., M.S. ('91), Ph.D. ('93), Assistant Professor of Metallurgy, Lehigh University. Residence: 203 Church Street, Bethlehem, Pa.

George Mann Richardson, A.C., Ph.D. (Johns Hopkins), Professor of Organic Chemistry. Leland Stanford, Jr., University, Stanford University, Cal.

*Augustus Stoughton Ross, M.E.

*Deceased.

*George Arthur Ruddle, Ph.B.

William Heysham Sayre, jr., M.E., Contractor, 306 Wyandotte Street, South Bethlehem, Pa.

John Selmar Siebert, C.E., Architect, Cumberland, Md.

John Henry Spengler, C.E., Principal Assistant Engineer, Bureau of Engineering, Room 325 City Hall, Chicago, Ill.

Edwin Stanton Stackhouse, B.M., E.M. ('87), General Business, Shickshinny, Pa.

Theodore Stevens, B.M., E.M. ('87), Electrical Engineer, Thames Iron Works and Shipbuilding Co., Limited, London. Residence: 71 Baalam Street, Plaistow, London, Eng.

Harry Eugene Stout, B.S. (in Mining and Metallurgy), Audenried, Pa.

*Joseph Kiddoo Surls, B.M.

Rev. William Patterson Taylor, B.A., Assistant, St. Peter's Church, Norristown, Pa.

Harry Toulmin, Ph.B., M.D., Physician, 4009 Chestnut Street, Philadelphia, Pa.

Priestley Toulmin, B.M., E.M. ('87), Chief Engineer and Superintendent of Mines, Sloss Iron and Steel Company, Brookside, Alabama.

Curtis Hussey Veeder, M.E., President Veeder Manufacturing Co., Corner of Garden and Sargent Streets, Hartford, Conn. Residence: 40 Willard Street.

CLASS OF 1887.

Frank Fielding Amsden, B.S., E.M. ('89), Superintendent Missouri Furnace Co., Station B., St. Louis, Mo.

Robert Webb Barrell, B.M., E.M. ('88), Assistant Manager Maxwell Gold Mining Co., Haines, Baker Co., Oregon.

Alexander Bonnot, C.E., Alexander Street, Norfolk, Va.

Charles Austin Buck, A.C., Chief Chemist, Bethlehem Iron Co., South Bethlehem, Pa. Residence: 521 Locust Street, South Bethlehem.

*Deceased.

Julian Carter Buckner, M.E., 1009 McCulloch Street, Baltimore, Md.

Benjamin Amos Cunningham, C.E., Division Engineer, L.V.R.R., Sayre, Pa.

Eugene Diven, M.E., of the firm of Diven & Redfield, Attorneys and Counselors-at-Law, 212 E. Water Street, Elmira, N. Y.

Alfred Doolittle, B.A., Director of the Observatory and Instructor in Mathematics in the Catholic University, Washington, D. C. Residence: 48 M Street, N. W.

Francis Rouad Dravo, M.E., care of F. R. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg. Residence: Edgeworth, Sewickley P.O., Pa.

Milton Henry Fehnel, B.S. (Sci.), A.C. ('89), Assistant Chemist at the Spreckels Refinery of the American Sugar Refining Co., Philadelphia, Pa. Residence: 265 South 9th Street.

Rev. Harvey Sheafe Fisher, B.A., B.D. (General Theological Seminary), Rector of St. Andrew's Church, Buffalo, N.Y. Residence: 380 Franklin Street.

Kenneth Frazier, B.A., Artist, 3 Washington Square, New York City.

*Henry Stevens Haines, M.E.

John Benjamin Hittell, C.E., Assistant Engineer, Bureau of Streets, 217 City Hall, Chicago, Ill. Residence: 1746 Wrightwood Avenue.

John Myers Howard, M.E., Forge Superintendent, Latrobe Steel Company, Latrobe, Pa.

Charles Colcock Jones, B.S. (in Mining and Metallurgy).

William Frederic Kiesel, jr., M.E., Draughtsman, Mechanical Engineer's Office, P. R. R., Altoona, Pa. Residence: 52 Washington Avenue.

James Wesson Kittrell, C.E., of the Stanwix Engineering Co., Hydraulic and Sanitary Engineers, Rome, N.Y.

Frederick Hayes Knorr, A. C., Traveling Auditor, Union Ice Co. of California. Residence: Los Angeles, Cal.

*Deceased.

*Samuel Davis Langdon, M.E.

John Walter Ledoux, C.E., M. Am. Soc. C. E., Chief Engineer, The American Pipe Mfg. Co., 112 North Broad Street, Philadelphia, Pa. Residence: Swarthmore, Pa.

Garrett Brodhead Linderman, Ph.B., Coal Operator, South Bethlehem, Pa.

Harry Smuller Meily, C.E., Assistant Supervisor, P.R.R., Huntingdon, Pa.

James Alexander Morrow, C.E., Hydraulic Engineer, American Water Works and Guarantee Co., Limited, Lewis Block, Pittsburg, Pa.

Henry Benjamin Charles Nitze, B.S., E.M. ('88), Mining Engineer and Geologist, Wetherill Concentrating Co., South Bethlehem, Pa. Permanent address: care Robt. Garrett & Sons, Baltimore, Md.

George Francis Pettinos, M.E., Senior member of the firm of Pettinos Brothers, Miners of American Graphite, Bethlehem, Pa.

Robert Henry Phillips, C.E., Manager, Washington, Arlington & Falls Church Ry. Co., Washington, D. C. Residence: 3342 M Street.

Rufus King Polk, B.S., E.M. ('88), General Manager North Branch Steel Co., Danville, Pa. Residence: 6 Walnut Street.

Charles Pope Pollak, C.E., Traveling Salesman, Fairbanks, Morse & Co., Chicago, Ill. Permanent address: 1129 N. Grand Avenue, St. Louis, Mo.

Mason Delano Pratt, C.E., Street Railway Engineer, The Pennsylvania Steel Co., Steelton, Pa.

Evan Turner Reisler, C.E., Roadmaster, New York, Lake Erie & Western R. R., Port Jervis, N. Y. Residence: 50 E. Main Street.

George Thomas Richards, C.E., care of The Drake and Stratton Co., Contractors, Conestoga Building, Pittsburg, Pa.

*John Warwick Scull, M.E.

*Deceased.

Frank Stuart Smith, A.C., Manager Sawyer-Man Electric Co., Allegheny, Pa.

Elmer Ellis Snyder, C.E., Roadmaster, Nashville & Decatur Division, and Nashville, Florence & Sheffield Ry., Louisville & Nashville R. R., Columbia, Tenn.

Harry Harkness Stoek, B.S., E.M. ('88), Editor Mines and Minerals, Care of Colliery Engineer Co., Scranton, Pa. Residence: 809 Quincy Avenue.

*Otway Owen Terrell, M.E.

Edward Power Van Kirk, B.M., Electrical Engineer, Elizabeth, Pa.

August Julius Wiechardt, M.E., Professor of Mechanic Arts, Agricultural College, Miss.

Henry August Julius Wilkens, B.S., E.M. ('88), General Manager, Wetherill Concentrating Co., 52 Wall St., New York City.

Frank Williams, B.S., E.M. ('88), Manager Basic Brick Co., and Fayette Manufacturing Co., 511 Main St., Johnstown, Pa. Permanent Address: 905 Tradesmen's Building, Pittsburg, Pa.

Nissley Joseph Witmer, C.E., Draughtsman, Dept. of Public Works of Philadelphia. Address: 4534 Frankford Avenue, Philadelphia, Pa.

*Hampton Woods, B.S. (Sci.), B.M. ('88), E.M. ('89).

George Frederic Yost, M.E., Acting Mechanical Engineer, L. V. Coal Co., Wilkes-Barre, Pa.

Charles F. Zimmele, Ph.B., Principal Bradley School, 205 Ninth Street, S.W., Washington, D. C.

CLASS OF 1888.

Charles Lambert Addison, M.E., General Roadmaster, Long Island Railroad. Residence: Hempstead, N.Y.

George Reade Baldwin, M.E., Manager of The Baldwin Electric Meter Co., Washington, D.C.

Charles Lincoln Banks, B.S. (Sci.), M.D., Physician and Surgeon, 254 State Street, Bridgeport, Conn.

*Deceased.

Edmund A. Bates, C.E., Draughtsman, Norton Iron Co., East Everett, Mass. Residence: 45 West Newton Street, Boston.

William Donaldson Beatty, C.E., Assistant Engineer, Philadelphia & Reading R.R. Address: Chief Engineer's Office, Reading Terminal, Philadelphia, Pa.

Hubert Alexander Bonzano, C.E., Civil Engineer and Contractor, 331 South 18th Street, Philadelphia.

William Bradford, C.E., Engineer Citizens' Traction Co., 142 South Negley Avenue, Pittsburg, Pa.

Adolph Theodore Bruegel, M.E., M.M.E. (Cornell, '96), Instructor in the Kinematics of Machinery, Sibley College, Cornell University, Ithaca, N.Y. Residence: 142 Cascadilla Place.

Otto Cornelius Burkhart, B.S., E.M. ('89), C.E. ('92), Mining Engineer, Assistant Superintendent Virginia Coal and Coke Co., Gayton, Henrico County, Va.

Charles Noble Butler, C.E., Attorney-at-Law, Patent, Trade-Mark, and Copyright Cases, 1001 Chestnut Street, Philadelphia, Pa.

Morton Lewis Byers, C.E., Engineer Maintenance of Way, Chicago Division P. C. C. & St. L. R. R., Logansport, Ind.

John Jesse Clark, M.E., Chief Instructor, The International Correspondence Schools, and Associate Editor of *Home Study*, P. O. Box 534, Scranton, Pa. Residence: 1210 Mulberry Street.

George Philip Connard, C.E., Engineer in charge of drafting, with Elmira Bridge Co., Lim., Box 63, Elmira, N.Y. Residence: 42 South Fifth Street, Reading, Pa.

Reuben Daniels, C.E., Civil Engineer, Pittsburg Plate Glass Co., Ford City, Pa.

George Herschel Davis, C.E., Assistant Engineer, Vermont Marble Co., Proctor, Vt.

William Schaff Davis, C.E., Civil Engineer and Surveyor, of the firm of Davis Bros., 519 Court Street, Reading, Pa. Residence: 49 North Fourth Street.

Philip Hoffecker DeWitt, C.E., Chief Engineer, 11 Pine Street, New York City.

Manuel Victor Domenech, C.E., City Engineer and Architect, Ponce, Porto Rico, West Indies.

George Patterson Dravo, M.E., Purchasing Agent for the Nordberg Mfg. Co., Builders of Corliss Engines, high duty and pumping engines, etc., Milwaukee, Wis. Residence: 374 Ninth Avenue.

Charles Wesley Focht, C.E., 15 North Centre Street, Pottsville, Pa.

George Steinman Franklin, M.E., with G. M. Steinman & Co., Hardware, 26 and 28 West King Street, Lancaster, Pa. Residence: 337 West Chestnut Street.

Samuel Wilson Frescoln, C.E., Civil Engineer and Contractor for Public Works, 7 and 9 Warren Street, New York City.

Louis Prevost Gaston, B.S. (in Mining and Metallurgy), C.E. ('89), Somerville, N.J.

William Gates, jr., C.E., Draughtsman, H. C. Frick Coke Co., Scottdale, Pa.

James Bolan Glover, jr., M.E., Superintendent of Motive Power, Marietta & North Georgia Ry., and proprietor of Glover Machine Works, Marietta, Ga.

Hughlett Hardcastle, M.E., M.D. (Univ. Md. '95), First Assistant Resident Physician, University Hospital, Lombard and Green Streets, Baltimore, Md. Permanent address: Easton, Md.

George Augustus Hart, M.E., Bethlehem Iron Co., South Bethlehem, Pa. Residence: 433 Birch Street.

Robert Browne Honeyman, B.S. (in Mining and Metallurgy), of the firm of Shiland & Honeyman, Attorneys-at-Law, 80 Broadway, New York City. Residence: Hotel Margaret, Brooklyn.

Sterry Henry Jencks, C.E., Construction Engineer, Pittsburg & Easton R. R., Mahaffey, Pa.

Alfred Eli Lewis, jr., B.S., E.M. ('89), 1510 Chestnut Street, Philadelphia, Pa.

Howard Hale McClintic, C.E., Assistant General Manager, Shiffler Bridge Company, 48th Street and A. V. R. R., Pittsburg, Pa. Residence: 108 Fairmount Avenue.

Walter Ashfield McFarland, M.E., Superintendent, Water Department of the District of Columbia, District Building, Washington, D.C.

Howard Leoser McIlvain, A.C., William McIlvain & Sons, Manufacturers of Boiler Plate, Reading, Pa.

James Struthers Mack, C.E., Mining Engineer for Hempfield, Greensburg, and Carbon Coal Companies, Greensburg, Pa.

Charles Donnell Marshall, C.E., Secretary Shiffler Bridge Company, 48th Street and A. V. R. R., Pittsburg, Pa. Residence: 226 Fairmount Avenue.

Charles Henry Miller, C.E., U. S. Surveyor, U. S. Engineer's Office, Equitable Building, Memphis, Tenn., Address: P. O. Box 204.

George Philips Miller, B.A. and M.A. (Bucknell), C.E., County Clerk and Recorder, Taos, New Mexico.

*John Hoff Millholland, C.E.

Harlan Sherman Miner, A.C., Assistant Chemist for the Welsbach Light Co., Gloucester City, N. J. Residence: 10 N. Broadway.

Harry Semple Morrow, M.E., Latrobe Steel Co., Latrobe, Pa. Home address: 732 Hill Street (Station D), Pittsburg, Pa.

Daniel Livermore Mott, C.E., Assistant City Engineer, Utica, N.Y.

William Lynville Neill, B.S. (Lat. Sci.), The New Domain Oil & Gas Co., Incorporated, Prestonsburg, Floyd County, Ky.

Howard Seger Neiman, A.C., Manager Technical Department, Wm. J. Matheson & Co., Limited, 182–184 Front Street, New York City.

*Harry Palmer, C.E.

Charles Jeremiah Parker, C.E., Division Engineer, L. V. R. R., Auburn, N.Y.

Robert Swain Perry, A.C., General Manager, Southern Bauxite Mining and Mfg. Co., Cave Spring, Ga.

* Deceased.

Francis William Birchall Pile, B.S., E.M. ('88), with the Lehigh Construction Co., Engineers and Contractors, Massena Springs, N.Y.

Albert George Rau, B.S. (Sci.), Superintendent Moravian Parochial School, 63 Broad Street, Bethlehem, Pa.

Clarence Elmer Raynor, C.E., Assistant Engineer, New York State Canals, Camillus, N.Y.

William Pemberton Richards, C.E., Assistant Engineer, District Offices, Washington, D.C. Residence: 309 Elm Street.

Osmond Rickert, C.E., Assistant Division Superintendent, Mahanoy Division, L. V. Coal Co., Lost Creek, Schuylkill Co., Pa.

William Richard Sattler, M.E., Contracting Engineer, 26 Cortlandt Street, New York City. Residence: 609 N. Broad Street, Elizabeth, N.J.

Eugene Hicks Shipman, C.E., 721 Cherokee Street, South Bethlehem, Pa.

William Alonzo Stevenson, M.E., Trainmaster, Lehigh Valley R. R., Sayre, Pa.

Wyndham Harvey Stokes, B.S., E.M. ('89), B.L. (Washington and Lee University '96), Attorney-at-Law, Welch, McDowell Co., W. Va.

Wilmer Marshall Webb, M.E., Estimating Department, Link Belt Machinery Co., 39th Street and Stewart Avenue, Chicago, Ill.

Harvey Musser Wetzel, C.E., Resident Engineer, Santiago Division, Ferro Carril Central Dominicana, Puerto Plata, Republic of Dominica, West Indies. Residence: Guanabano, R.D.

Winter Lincoln Wilson, C.E., Instructor in Civil Engineering, Lehigh University, South Bethlehem, Pa. Permanent address: Elkton, Md.

Edward Benjamin Wiseman, C.E., Supervisor, Shamokin Divison, Northern Central Ry., Shamokin, Pa.

Shuntaro Yamaguchi, C.E. (and Imperial University of Tokio '72), Railway Department, Mitsui & Co., Tokio, Japan. Residence: 2 Fuzimaye Cho, Komagome, Tokio.

Luther Reese Zollinger, C.E., Assistant Supervisor P. R. R., Spruce Creek, Pa.

CLASS OF 1889.

James Willoughby Anderson, B.S., E.M. ('90), Examiner, U. S. Patent Office, Washington, D. C.

* Pearce Atkinson, M.E.

Gustav Ayres, M.E., U. S. Patent Office. Address: 1311 New Hampshire Avenue, Washington, D. C.

Ralph Putnam Barnard, C.E., LL.M., Accountant, Equitable Coöperative Building Association, 1003 F Street, N. W., Washington, D. C. Residence: 1011 O Street, N. W.

Albert Harlan Bates, M.E., LL.B. (Ohio State Univ.), Attorney-at-Law in Patent Cases, 1543 Monadnock Block, Chicago, Ill.

Samuel Erwin Berger, B.A., M.A. ('93), Assistant Professor of Latin and Greek, Central High School, Philadelphia, Pa. Residence: 1027 Mt. Vernon Street.

Charles Hudson Boynton, B.S. (Lat. Sci.), Night Manager, The Associated Press, Corcoran Building, Washington, D. C. Residence: 1357 Princeton Street, N. W.

Joseph Leander Budd, A.C., of the firm of Budd & Kite, Jewelers, 22 N. Thirteenth Street, Philadelphia, Pa.

Rev. Edgar Campbell, B.A., Rector of St. Peter's Church, Phœnixville, Pa.

Francis Joseph Carman, A.C., Producer of Petroleum, Bothwell, Ontario, Canada.

Herbert MacKenzie Carson, M.E., Assistant Engineer of Motive Power, Pennsylvania Railroad, Altoona, Pa.

Holden William Chester, C.E., Assistant Engineer, Beech Creek R. R. Co., Jersey Shore, Pa.

William Corbin, B.S. (in Mining and Metallurgy), Druggist, Gillette, Colo.

* Deceased.

Justice Cox Cornelius, C.E., Chief Draughtsman, The Wharton Railroad Switch Co., Jenkintown, Pa. Residence: Highland Ave., Chestnut Hill, Philadelphia, Pa.

William Albert Cornelius, M.E., Superintendent of 33″, 23″, and 10″ Structural Mills, Homestead Steel Works of the Carnegie Steel Co., Munhall, Pa.

Charles Herbert Deans, C.E., Vice-President of Sooysmith & Co., Contracting and Consulting Engineers, Mills Building, New York City. Residence: 804 St. Nicholas Ave.

Charles Estell Dickerson, jr., B.S. (Sci.), Vice-President, Mt. Hermon School, in charge of department of Physics and Chemistry, Mount Hermon, Mass.

Emil Diebitsch, C.E., Superintendent of Construction for C. L. W. Eidlitz, Architect, 25th Street and Broadway, New York City. Residence: 177 Schermerhorn Street, Brooklyn.

John Webster Dougherty, B.S. (in Mining and Metallurgy), Superintendent, Blast Furnace Department, Pennsylvania Steel Co., Steelton, Pa.

Ralph Marshall Dravo, B.S., (in Mining and Metallurgy), of R. M. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg, Pa. Residence: Edgeworth, Sewickley P. O.

Ernest Hipolite Du Vivier, A.C., Mercantile, 22 Warren Street, New York City.

William Dolloway Farwell, B.A., Night City Editor, *The Tribune*, New York City. Residence: Psi Upsilon Club, 64 West 39th Street.

Henry William Frauenthal, A.C., M.D., Physician, 214 East 50th Street, New York City.

Arthur Hugh Frazier, B.A., Vineyardist, Inglenook Vineyard, Rutherford, Napa Co., Cal.

Frederick Louis Grammer, B.S. E.M. ('90), Superintendent of Furnaces, Lackawanna Iron and Steel Co., Lebanon and Cornwall. Address: Cornwall, Pa.

George Wentz Harris, B.S. (in Mining and Metallurgy), Mining Engineer, Elkhorn, McDowell Co., W. Va.

Lightner Henderson, C.E., of the firm of Purdy & Henderson, Civil Engineers, 1553 Monadnock Building, Chicago, Ill., and 78 Fifth Avenue, New York City.

Conrad Egbert Hesse, B.S. (in Mining and Metallurgy), 508 A Street, S. E., Washington, D.C.

Clarence Walter Hudson, C.E., Assistant Engineer, Phœnix Bridge Co., Phœnixville, Pa.

Archibald Johnston, M.E., in charge of Armor Plate Department, Bethlehem Iron Co. Residence: 120 Church Street, Bethlehem, Pa.

John Stower Kellogg, jr., A.C., Night Superintendent, Illinois Steel Co., South Chicago, Ill.

John Martin Sharpless Kerlin, M.E., Elwyn, Pa.

Sylvanus Elmer Lambert, B.A., M.A. ('91), of the firm of Lambert & Martin, Attorneys and Counselors-at-Law, 1010 Ashland Block, Chicago, Ill.

John Joseph Lincoln, C.E., Chief Engineer and Superintendent, Crozer Land Association, Elkhorn, W. Va.

John Lockett, M.E., Engineer in employ of West India Improvement Co. Permanent address: Bog Walk P. O., Jamaica, W. I.

Arthur Long, A.C., Merchant, Wilkes-Barre, Pa.

John Joseph Martin, C.E., Consulting Engineer, 215 West 125th Street, New York City.

*Charles Henry Miller, A.C.

Charles Williams Moffett, M.E., Mechanical Manager, National Water Tube Boiler Co., New Brunswick, N.J.

Richard Henry Morris, jr., B.S. (in Mining and Metallurgy), Bristol, Pa.

William Ellis Morris, A.C., 19th and E Streets, Portland, Oregon.

John Thomas Morrow, M.E., Superintendent, Electrolytic Copper Refining Plant of the Boston and Montana Consolidated Copper and Silver Mining Co., Great Falls, Mont.

Albert Daniel Oberly, C.E., Engineer Corps, H. C. Frick Co., Scottdale, Pa.

* Deceased.

Joseph Michael O'Malley, A.C., M.D., Physician, 2217 South Broad Street, Philadelphia, Pa.

Robert Henry Eddy Porter, M.E., of the firm of Porter & Remsen, Engineers and Agents, 39 Cortlandt Street, New York City.

Arnold Karthaus Reese, B.S., E.M. ('90), Superintendent Blast Furnace, Mary.and Steel Co., Sparrow's Point, Md.

Abraham Lincoln Rogers, M.E., President of the National Brewing Co., Jeannette, Pa.

Charles William Schwartz, jr., M.E., Secretary and Business Manager, Philadelphia Textile Machinery Co., 2720 Hancock Street, Philadelphia, Pa. Residence: 43 Tulpehocken Street, Germantown, Pa.

Arthur Moult Smyth, B.S., E.M. ('90), 66 Quintarda, Rio de Janeiro, Brazil.

Alfred Walton Stockett, C.E., Mine Surveyor, Geldenhuis Deep Gold Mining Co., P. O. Box 1906, Johannesburg, South African Republic.

Lester Clark Taylor, C.E., F. C. Central Norte, Cordova, Argentine Republic, S. A.

Augustus Thompson Throop, C.E., with Dobbie Foundry and Machine Co., Niagara Falls, N. Y.

Charles Prentice Turner, M.E., with the International Correspondence Schools, Scranton, Pa. Residence: 1214 Vine Street.

Clarence Walker, B.S., E.M. ('90), Assistant to Engineer of the Consolidated Traction Companies, *Times* Building, Pittsburg, Pa. Residence: 5757 Parker Street.

Fritz August Weihe, M.E., Ph.D. (Berlin, '97), Professor of Physics and Electrical Engineering, North Carolina College of Agriculture and Mechanic Arts, Raleigh, N. C.

Walter Earle Weimer, A.C., Treasurer, Lebanon Boiler, Foundry & Machine Co., Lebanon, Pa. Residence: 724 Cumberland Street.

Harry Rush Woodall, B.S. (in Mining and Metallurgy), Second Assistant, Second City Survey District, 630 Wood St., Philadelphia, Pa.

Edward Austin Wright, C.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 208 T Street, N. W.

Joseph Bodine Wright, C.E., 424 West 23d Street, New York City.

CLASS OF 1890.

Thomas C. J. Baily, jr., C.E., Office of Engineer Commissioner, District Building, Washington, D. C. Residence: 403 C Street, S. E.

Frederick Richard Barrett, C.E., Roadmaster Pocahontas Division, Norfolk and Western Ry., Bluefield, W. Va.

Edwin Herbert Beazell, C.E., Bridge Division, Bureau of Engineering, Carnegie Steel Co., Limited, Room 1418 Carnegie Building, Pittsburg, Pa. Residence: 463 Ella Street, Station D.

Adolph Cardenas, C.E., Engineer Corps, Nicaragua Canal, Managua, Nicaragua, C. A.

William Phelps Cleveland, A.C., Chemist for Empire Zinc Company, Joplin, Mo.

Frank Raymond Coates, B.S., E.M. ('91), Roadmaster, New York Division, N. Y., N. H. & H. R. R. R., Stamford, Conn.

Warren Scott Cope, C.E., Civil and Mining Engineer, McDowell, McDowell Co., W. Va.

Charles Ellery Coxe, B.S., E.M. ('91), Assistant to Manager of the Lixiviation Plant, Hacienda de Platas, Zacatecas, Mexico. Permanent address: care of Mr. W. E. C. Coxe, Toledo, O.

James Barlow Cullum, A.C., with Woodland Fire Brick Co., Woodland, Clearfield Co., Pa.

John William DeMoyer, C.E., Assistant Supervisor, Philadelphia & Reading R. R., Pottsville, Pa.

* Clement Heyser Detwiler, C.E.

Charles Edward Fink, C.E., Draftsman and Computer of Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa. Residence: Camphill, Cumberland Co., Pa.

* Deceased.

*Frederick Elmer Fisher, C.E.

Frank Roberts Fisher, C.E., Bureau of Surveys, 1845 N. 22d Street, Philadelphia, Pa.

Howard Augustus Foering, B.S. (Sci.), Principal, Preparatory School for Lehigh University, Bethlehem, Pa.

Ralph Goodman, C.E., Assistant Supervisor, Philadelphia Yards, Pennsylvania R. R., Thirty second Street and Powelton Avenue, Philadelphia, Pa. Residence: 1220 Reed St.

George Ellsworth Greene, C.E., Assistant Engineer, Erie Canal, 757 Powers Bldg., Rochester, N. Y. Residence: 309 East Avenue.

Harry Walter Harley, M.E., care of H. M. Harley, Gloucester City, N. J.

David Garth Hearne, C.E., Foreman Steel Department, Riverside Iron Works, Wheeling, W. Va.

James S. B. Hollinshead, B.S., E.M. ('91), Mining Engineer, Butte & Boston Consolidated Mining Co., Butte, Montana.

Frederic Kidder Houston, M.E., Illustrator, *The New York Recorder*. Residence: Ridgewood, N. J.

William Vincent Kulp, C.E., with Milliken Brothers, Engineers and Contractors, 39 Cortlandt Street, New York City.

Henry Meyers Kurtz, C.E., Mining and Civil Engineer, Clearfield, Pa.

Harry Kinzer Landis, B.S., E.M. ('91), 280 Broadway, New York City. Residence: 127 East 46th Street.

Thomas Smith Leoser, A.C., Editor and Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: 451 Madison Avenue, Elizabeth, N. J.

John Elmer Litch, M.E., with Pennsylvania Steel Co., Steelton, Pa.

Charles Herbert Miller, A.C., C. H. Miller Hardware Co., Huntingdon, Pa.

George Nauman, jr., C.E., with the Pennsylvania R. R. Engineer Corps, Delair, N. J.

* Deceased.

Robert Engler Neumeyer, C.E., Borough Engineer of Bethlehem, Borough Engineer of South Bethlehem, Water Superintendent for the Bethlehem Water Co. Residence: 16 Goepp Street, Bethlehem.

William Cassidy Perkins, C.E., Master in Mathematics at DeVeaux College, Niagara Falls, N. Y.

Asa Emory Phillips, C.E., Assistant Engineer, Engineer Department of the District of Columbia, Division of Sewers, Washington, D. C. Residence: Takoma Park, D. C.

Charles Platt, A.C., Ph.D. (Ohio University), F.C.S., Consulting Chemist, Professor of Chemistry and Toxicology, Hahnemann Medical College, Philadelphia.

Alexander Potter, C.E., Civil and Sanitary Engineer, Rooms 83–85, 137 Broadway, New York City.

Edward Williams Pratt, M.E., General Inspector, Chicago & Northwestern Ry., Chicago. Residence: 425 S. Elmwood Avenue, Oak Park, Ill.

Edwin Jay Prindle, M.E., LL.M., Assistant Examiner, U. S. Patent Office. Residence: P. O. Box 73, Washington, D. C.

Wallace Carl Riddick, C.E., Professor of Mathematics and Civil Engineering, North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N. C.

John Stover Riegel, M.E., with Warren Paper Mfg. Co., Riegelsville, Warren County, N. J.

Joseph Edgar Sanborn, A.C., Chemist, Warwick Iron Co., Pottstown, Pa. Residence: 244 King Street.

Harry Johns Sherman, C.E., member of firm, Henry S. Haines, Civil Engineering, Water Works, etc., 313 Temple Building, Camden, N. J. Residence: Broad Street, Mount Holly, N. J.

William Calvin Shoemaker, C.E., Assistant Superintendent, Dayton and Michigan Division, C. H. & D. Ry., Lima, Ohio.

Michael Druck Sohon, A.C., M.S. ('95), Ph.D. (Johns Hopkins), in charge of Department of Chemistry, High School, 3080 Third Avenue, New York City.

William Alston Stevenson, M.E., Superintendent, Stearns Mfg. Co., Engine, Boiler, and General Machine Builders, Erie, Pa. Residence: 225 W. 11th Street.

Theodore Alfred Straub, C.E., Vice-President and General Manager, Fort Pitt Bridge Works, Pittsburg, Pa. Residence: 4921 Forbes Street.

Francis du Pont Thomson, M.E., Edgar Thomson Steel Works, Braddock, Pa. Residence: 4737 Bayard Street, Pittsburg, Pa.

Charles Cookman Tomkinson, M.E., Chief Draftsman for Stearns Mfg. Co., 329 W. Fifth Street, Erie, Pa.

Claude Allen Porter Turner, C.E., Assistant Engineer, Gillette-Herzog Manufacturing Co., Minneapolis, Minn.

Aaron Howell Van Cleve, C.E., Office Assistant, in charge of Drafting-room, Cataract Construction Co., Echota, Niagara Falls, N. Y.

José Ramon Villalon y Sanchez, C.E., Santiago de Cuba, Isle de Cuba.

Samuel Dexter Warriner, B.A. (Amherst), B.S., E.M. ('90), Superintendent Calumet & Hecla Mining Co., Calumet, Mich.

David Thomas Williams, M.E., Draftsman, Bethlehem Iron Co. Residence: Catasauqua, Pa.

Herbert Wright, M.E., Assistant Examiner, U. S. Patent Office, Washington, D. C.

CLASS OF 1891.

Murray Blachly Augur, E.E., Train Master, Buffalo Division, Lehigh Valley Railroad, Buffalo, N. Y.

James Edwin Boatrite, B.A. (S. W. Presb. Univ.), C.E., *World* Building, New York City.

J. W. Boyd, C.E., Division Engineer, Coal Department, Delaware and Hudson Canal Co., Room 25, D. & H. C. Co. Depot, Scranton, Pa.

John Emery Bucher, A.C., Ph.D. (Johns Hopkins), Assistant Professor of Chemistry, Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I.

Jacob Burr Buckley, E.E., Carpenter and Builder, Oxford, N.Y.

Emanuel Chao, C.E., Cienfuegos, Cuba.

Edward Haviland Coxe, C.E., Mining Engineer, Sunday Creek Coal Co., Corning, Perry Co., O.

Warder Cresson, M.E., with Lehigh Valley Railroad Co., Swarthmore, Delaware Co., Pa.

John Rose Davis, C.E., Assistant Engineer, Erie R. R., Port Jervis, N.Y.

Eric Doolittle, C.E., Flower Observatory, Upper Darby P. O., Philadelphia, Pa.

Alban Eavenson, A.C., Chemist, J. Eavenson & Sons, 313 N. Twentieth St., Philadelphia, Pa. Residence: 2013 Vine Street.

Juan de la Cruz Escobar, M.E., Mechanical Engineer and Contractor, Matanzas, Cuba.

Walton Forstall, E.E., Superintendent, Lockport Gas and Electric Light Company, Transit and LaGrange Sts., Lockport, N.Y.

John Stillwell Griggs, jr., M.E., Consulting Mechanical and Electrical Engineer, 99 Cedar Street, New York City. Residence: 38 Lenox Road, Brooklyn.

George Samuel Hayes, C.E., Engineer for the Tostevin-Hayes Fireproof Construction Co., 1123 Broadway, New York City. Residence: 129 W. Thirteenth St.

John Sidney Heilig, M.E., Secretary and Treasurer, Lenox Mfg. Co., manufacturers of sewing machine attachments, Allentown, Pa. Residence: 529 Allen St.

William Albert Heindle, C.E., with E. Saxton, Contractor, Washington, D. C. Residence: 251 North High St., Baltimore, Md.

John Franklin Hersh, C.E., Hardware Merchant, 825 Hamilton Street, Allentown, Pa.

Hermann Victor Hesse, B.S., E.M. ('92), Lehigh Valley Coal Co., Lost Creek, Pa.

Paul Depue Honeyman, E.E., Chief Foreman, Underground and Central Office, The Metropolitan Telephone and Telegraph Co., 18 Cortlandt St., New York City.

John Turner Hoover, B.S. (in Architecture), Philipsburg, Pa.

Hagime Ichikawa, A.C., Imperial Printing Bureau, Tokio, Japan.

Albert Edward Juhler, A. C., Chemist, Standard Oil Co., Olean, N.Y. Residence: 163 Fourth Street.

Henry Kemmerling, C.E., Teaching, 2623 Main Avenue, Scranton, Pa.

Herman Meriwether Knapp, C.E., Contracting Engineer for the Pittsburg Bridge Company, American National Bank Building, Louisville, Ky.

Rev. Frederic Curtiss Lauderburn, B.A., Rector Calvary Protestant Episcopal Church, Tamaqua, Pa.

Charles McKnight Leoser, B.S., E.M. ('92), Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: Hotel Endicott, 81st Street and Columbus Avenue, New York City.

James Anderson McClurg, B.S. (in Metallurgy), Estimating Department of Keystone Bridge Works, 51st Street, Pittsburg, Pa. Residence: Sewickley.

Frank Anderson Merrrick, E.E., with Blood and Hale, Consulting Engineers, 305 Equitable Building, Boston, Mass.

John Zollinger Miller, E.E., Manager and Superintendent of the Mutual Telephone Co., Room 32, Downing Building, Erie, Pa.

Harry Timothy Morris, M.E., in charge of Plate and Universal Mills, Bethlehem Iron Co., South Bethlehem, Pa. Residence: P.O. Building, Bethlehem.

Paul Mayo Paine, C.E., Associate Editor *The Post*, Syracuse, N.Y. Residence: 101 White St.

Edwin Adams Quier, A.C., Secretary, Reading Fire Brick Works, Reading, Pa. Residence: 302 South Fifth Street.

Walter Freeman Rench, C.E., Assistant Supervisor, P. R. R., St. Mary's, Pa. Residence: Commercial Hotel.

Robert Schmitz, C.E., United States Surveyor, U. S. Engineer Office, Lock Box 812, Philadelphia, Pa.

Ellis Anstett Schnabel, B.A., M.A. ('93), Assistant Professor of Latin and Greek, Central High School, Broad and Green Streets, Philadelphia, Pa. Residence: 216 DeKalb Square, West Philadelphia, Pa.

Leidy Rudy Shellenberger, C.E., Assistant Engineer with Pencoyd Iron Works. Residence: 215 Rochelle Avenue, Wissahickon, Philadelphia, Pa.

Ira Augustus Shimer, B.A., M.D. (Univ. Pa., '97), Resident Physician, St. Luke's Hospital, South Bethlehem, Pa.

Horace Theodore Stilson, C.E., 40 Church Street, Winchester, Mass.

R. Paul Stout, M.E., General Foreman, Armor Plate Department, Bethlehem Iron Company, South Bethlehem, Pa. Residence: 332 Market Street, Bethlehem.

James Edward Talmage, A.C., D.Sc.D., Ph.D., F.R.M.S., F.R.S. (Edin.), F.G.S., Professor of Geology, University of Utah, Salt Lake City, Utah.

William Sidney Topping, B.S. (Lat. Sci.), Ph.G., Druggist, Main Street, East Islip, N. Y.

Domingo Anthony Usina, C.E., Assistant Examiner of Patents, Room 32, Patent Office, Washington, D. C. Residence: 409 Fifteenth Street, N. W.

Elias Vander Horst, C.E., with W. R. Fleming & Co., 620 Atlantic Avenue, Boston, Mass.

George Edward Wendle, E.E., Lycoming Electric Co., Williamsport, Pa.

Peyton Brown Winfree, C.E., City Engineer, Bradford, Pa.

CLASS OF 1892.

Rev. William North Robins Ashmead, B.A., Missionary, St. John's P. E. Mission, Westfield, Tioga Co., Pa.

*George W. B. Asmussen, C.E.

Robert Ligget Baird, C.E., Engineer Corps, P. R. R., Mifflintown, Pa.

Joseph Barrell, B.S., E.M. ('93), M.S. ('97), Assistant Engineer, Butte & Boston Consolidated Mining Co., Butte, Mont. Address: P. O. Box 1172.

* Deseased.

John Young Bassell, jr., B.S., E.M. ('95), Hotel Chittenden, Columbus, O.

John Newbaker Bastress, C.E., Assistant Engineer, Berlin Iron Bridge, East Berlin, Conn.

John Mayall Beaumont, M.E., 125 South Seventh Street, Scranton, Pa.

William Williams Blunt, E.E., Engineer, Westinghouse Electric Co., Limited, 32 Victoria Street, London, S. W., England.

William Young Brady, B.S. (in Architecture), studying in Europe; will reside at Pittsburg, Pa.

Charles Merritt Case, B.S., E.M. ('93), Treasurer Royal Elevator Co., grain dealers, 55 Chamber of Commerce Building, Minneapolis, Minn.

George Price Case, B.S., E.M. ('93), Grain, 26 Chamber of Commerce, Minneapolis, Minn. Residence: The Swinburne.

Philip Lothrop Cobb, C.E., 2509 Euclid Avenue, Cleveland, O.

Frederick Albert Coleman, C.E., Hydraulic and Sanitary Engineer, Rome, N. Y.

Samuel Dewey Cushing, M.E., Asst. Supt. Binghamton General Electric Co., 79 State Street, Binghamton, N. Y. Residence: 52 Main Street.

Herman Haupt Davis, M.E., General Manager of the Galisteo Mining Co., Cerrillos, New Mexico.

Morgan Davis, jr., B.S. (in Mining), General Superintendent Elk Hill Coal and Iron Co., Scranton, Pa.

William Russell Davis, C.E., 1455 Washington Avenue, New York City.

Heber Denman, B.S. (in Mining), Assistant Engineer, Berwind-White Coal Mining Co., Scalp Level, Cambria Co., Pa.

Edwin Dodge, B.S. (in Metallurgy), Gouverneur, N. Y.

Percival Drayton, M.E., Superintendent Blooming and Continuous Bar Mills, Apollo Iron and Steel Co., Vandergrift, Westmoreland Co., Pa.

*Harry S. Eckert, A.C.

* Deceased.

Lester Hallett Ely, A.C., care of Coxe Brothers and Company, 143 Liberty Street, New York City. Residence: 26 East Third Street, Bayonne, N. J.

George Washington Engel, B.S., E.M. ('93), Assistant Engineer, Lehigh Coal and Navigation Co., Lansford, Pa.

Thanlow Gjertsen, C.E., Engineer in charge, Clinton Cement Co., Pittsburg, Pa. Permanent address: Saxton, Pa.

*John Adams Gruver, B.A.

William Lawall Jacoby, M.E., Latrobe Steel Company, 1720 Old Colony Building, Chicago, Ill.

Alfred Emerson Jessup, B.S. (in Metallurgy), Manager, New York branch of Herendeen Manufacturing Co., Manufacturers of Steam and Hot Water Boilers, 39 Cortlandt Street, New York City. Residence: 101 West 81st Street.

Juan José Jimenez, C.E., 566 Washington Avenue, Brooklyn, N. Y.

Herman Eugene Kiefer, A.C., M.S. ('94), Ph. D. ('96), Instructor in Geology, Lehigh University. Residence: 438 Cherokee Street, South Bethlehem, Pa.

Robert Reed Kitchel, C.E., with E. D. Leavitt, Mechanical Engineer, Cambridgeport, Mass.

Sylvester Welch Labrot, C.E. Assistant Engineer, L. & N. R. R., Chief Engineer's Office, Louisville, Ky.

Henry Lefevre, B.S., E.M. ('93), Asst. Engineer, Playa de Oro Gold Mining Co., Playa de Oro, Ecuador. Permanent address: care Henry Lefevre, Panama, Republic of Colombia, South America.

Alfred Emory Lister, M.E., Mechanical Engineer for Delaware & Hudson Canal Co., Coal Department, Room 27 D. & H. Station, Scranton, Pa.

William John Lloyd, E.E., with James G. Biddle, 910 Drexel Building, Philadelphia, Pa. Residence: 21 North 50th Street.

*Deceased.

John Taylor Loomis, E.E., District Agent, Real Estate Department, P. & R. R. R., Reading Terminal, Philadelphia. Residence: 503 South 41st Street.

Henry Lewis Manley, B.S., E.M. ('93), Division Engineer, Lehigh Valley Coal Co., Hazleton, Pa. Residence: 58 North Laurel Street.

Raymond S. Masson, E.E., District Engineer, Westinghouse Electric & Manufacturing Co., Mills Building, San Francisco, Cal.

Edward James Millar, C.E., Civil and Sanitary Engineer, 19 Masonic Temple, Wheeling, W. Va.

Charles Tyler Mosman, E.E., Power and Mining Engineering Department, General Electric Co., Schenectady, N. Y. Residence: 406 Union Street.

Robert Blum Olney, C.E., Acting Engineer, Sewerage Department, Charleston, S. C. Residence: 139 St. Philip Street.

Henry Orth, jr., B.S., E.M. ('93), Patent Attorney, 1011 L Street, N. W., Washington, D. C.

Ramon Eckhart Ozias, B.S. (in Metallurgy), Assayer, U. S. Laboratory, New York City. Permanent address: Quakertown, Pa.

Frank DeWitt Randolph, M.E., Head Draftsman, C. Potter, jr., & Co., Manufacturers of Printing Presses, 444 West Front Street, Plainfield, N. J.

Robert Swenk Rathbun, C.E., Manager Lehigh Engineering Co., 5 Paxson Building, Allentown, Pa. Residence: 11 North 10th Street, .

Samuel Arthur Rhodes, E.E., Engineering Department, Chicago Telephone Co., Chicago, Ill. Residence: 429 North Pine Avenue, Austin, Ill.

John Ira Riegel, C.E., Assistant Engineer, Easton and Amboy Division, Lehigh Valley R. R. Residence: 439 Cherokee Street, South Bethlehem, Pa.

Anton Schneider, C.E., Assistant Engineer, Oregon Short Line R. R., Salt Lake City, Utah.

John Bonner Semple, A.C., Secretary of Sterling Varnish Co., 325 Water Street, Pittsburg, Pa. Residence: Sewickley.

Cass Knight Shelby, M.E., Motive Power Department, P. R. R., Altoona, Pa. Address: P. O. Box 314.

James Causten Shriver, C.E., Civil Engineer, 4 Water Street, Cumberland, Md.

Philip Henry Waddell Smith, E.E., Assistant General Manager of Standard Underground Cable Co., Westinghouse Building, Pittsburg, Pa. Residence: 6730 McPherson Street.

Michael Neligan Usina, E.E., Engineer of Tug "Bristol," Savannah, Ga. Residence: 401 Waldburg St., West.

Lester Warren Walker, E.E., Electrical Contractor, Savannah, Ga. Residence: 321 Congress Street, West.

David Heikes Witmer, C.E., Assistant Engineer, American Pipe Manufacturing Co., 112 North Broad Street, Philadelphia, Pa.

Frederic Wittman, A.C., Lanark, Pa.

Charles Oaks Woods, M.E., with T. B. Woods' Sons, Manufacturers of Machinery for the Transmission of Power, Chambersburg, Pa.

Byron Edgar Woodcock, C.E., with the California Eastern Railway Co., 132 Stimson Block, Los Angeles, Cal.

CLASS OF 1893.

George Haldeman Atkins, C.E., Pottsville, Pa.

Harry Jacobs Atticks, E.E., Lisburn, Pa.

Hugh Cunningham Banks, C.E., General Engineering, Room 344 Equitable Building, Atlanta, Ga.

Noble C. Banks, B.S. (in Metallurgy), Acting General Manager, Valley View Gold Mining Co., Telluride, Col. Permanent address: care of John T. Graham, Esq., 604 Equitable Building, Denver, Col.

Herman Renner Blickle, C.E., Secretary and Chief Engineer, Fort Pitt Bridge Works, Pittsburg, Pa.

William Irvin Boyd, C.E., District Engineer's Office, No. 70 I Street, N. E., Washington, D. C.

Frederick Edgar Bray, C.E., Structural Draftsman, Carnegie Steel Co., Limited, 1420 Carnegie Building Pittsburg, Pa. Residence: 227 Fisk Street.

Gilbert Forbes Burnett, B.S. (Sci.), Teaching, Mountain View, N. J. Permanent address: New Providence, N. J.

George Edwin Chamberlain, A.C., Chemist for the Glucose Sugar Refining Company, Chicago, Ill.

Warren Fellman Cressman, C.E., Sellersville, Pa.

Rev. Walter Joseph Dech, B.A., Pastor of New Salem Church, Danielsville, Pa.

Charles Malcolm Douglas, B.A., General Theological Seminary, Chelsea Square, New York City.

Charles Hazard Durfee, E.E., Insurance and Real Estate Broker, Treasurer People's Coöperative Bank, 60 Bedford Street, Fall River, Mass. Residence: 807 High Street.

Bernard Enright, A.C., Assistant Chief Chemist, Bethlehem Iron Company, South Bethlehem, Pa. Residence: 330 E. Fourth Street.

Henry Brown Evans, M.E., Instructor in Astronomy, University of Pennsylvania. Address: Flower Observatory, Upper Darby, Delaware Co., Pa.

George Harwood Frost, M.E., B.A. Sc. (McGill Univ., '96), with Frost & Wood, Manufacturers of Agricultural Machinery, Smith's Falls, Ontario, Canada.

Frederick Pardee Fuller, E.E., Construction Department, Metropolitan Telephone and Telegraph Co., New York City. Residence: 140 West 57th Street.

Robert Foster Gadd, C.E., Estimating Department, Levering & Garrigues, 552–554 West 23d Street, New York City. Residence: 63 West 50th Street. Permanent address: Sudlersville, Md.

Charles Willits Gearhart, E.E., Electrician, New York and Brooklyn Bridge, 403 3d Street, Brooklyn, N.Y.

Harvey Hartzell Godshall, A.C., of the firm of A. C. Godshall & Co., Millers, Lansdale, Pa.

Samuel Laury Graham, A.C., Analytical Chemist and Assayist, Rome Testing Laboratory, Rome, Ga.

Lee Stout Harris, C.E., Civil, Mining, and Electrical Engineer, for Pulaski Iron Co., Eckman W. Va.

Claude Sanford Haynes, C.E., Assistant City Engineer, City Hall, Elmira, N.Y. Residence: 205 W. Hudson Street.

Richard Willis Heard, E.E., Swissvale, Pa.

Robert Culbertson Hays Heck, M.E., Instructor in Mechanical Enginering, Lehigh University, South Bethlehem, Pa.

Charles Lincoln Keller, M.E., with the Scherzer Rolling Lift Bridge Co., Chicago, Ill. Permanent address: 5490 East End Avenue, Chicago, Ill.

Schuyler Brush Knox, C.E., with Berlin Iron Bridge Co., East Berlin, Conn.

Frank Sigismund Loeb, A.C., Manufacturing Chemist, Manufacturers' Building, Providence, R.I.

Hiram Dryer McCaskey, B.S. (in Mining), Head Master, St. Thomas Hall, Holly Springs, Miss.

Charles Louis McKenzie, C.E., with the Shiffler Bridge Co., 1123 Betz Building, Philadelphia, Pa.

William Price Marr, E.E., Superintendent, Shamokin & Mt. Carmel Electric Railway Co., Shamokin, Pa.

Archibald Stewart Maurice, C.E., Athens, Pa.

George Holbrooke Maurice, C.E., Athens, Pa.

James Edgar Miller, M.E., Electrical Engineer for the Siemens & Halske Electric Co. of America, 1215 Monadnock Block, Chicago, Ill. Residence: 2251 Calumet Avenue.

William Frederick Mylander, C.E., 509 North Carrollton Avenue, Baltimore, Md.

Clinton Ledyard Olmsted, C.E., Eagle, N.Y.

Charles Joseph O'Neill, E.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 910 Massachusetts Avenue, N. E.

Nathaniel Montgomery Osborne, jr., C.E., 171 Freemason Street, Norfolk, Va.

Charles William Parkhurst, E.E., Assistant Superintendent Electrical Dept., Cramp's Shipyard, Philadelphia, Pa. Residence: 1427 Hanover Street.

Duncan White Patterson, M.E., Assistant Master Me-

chanic of the Montour Rolling Mills Department of the Reading Iron Co., Danville, Pa.

John Gates Peck, C.E., care of Milliken Brothers, 39 Cortlandt Street, New York City. Residence: 12 East 32d Street, Bayonne, N.J.

Raymond Bernard Fitz Randolph, A.C., Bacteriologist, Brooklyn Health Department, Hoagland Laboratory, Henry and Pacific Streets, Brooklyn, N.Y.

John Graham Reid, C.E., Chief of Surveys, Union Traction Co., Philadelphia, Pa. Residence: 2412 Stanley Street.

Edwin Clark Reynolds, C.E., Topographer, U. S. Survey for Deep Waterways, Cohoes, N.Y. Residence: 87 Mohawk Street. Permanent address: Station E, Washington, D. C.

Francis Evans Richards, C.E., Cobbs Switch, Lowndes Co., Miss.

George William Ritchey, B.S. (Lat. Sci.), 26 Bluff Street, Pittsburg, Pa.

Frederick Brittan Sage, E.E., Hackensack, N.J.

Martin Luther Saulsbury, C.E., Civil Engineer, Westfield, N.J.

Joseph A. Schloss, A.C., Chief Chemist, La Gran Fundicion Nacional Mexicana, Monterey, Mexico.

Armin Schotte, C.E., care of Riter and Conley, Allegheny, Pa. Residence: 237 Fisk Street, Pittsburg, Pa.

William Frederick Semper, A.C, Chemist, Haskel & Barker Car Co., 832 Pine Street, Michigan City, Ind.

Alexander Betty Sharp, B.S. (in Metallurgy), General Manager, W. L. Sharp & Son, manufacturing fireplace goods, Steubenville, O.

Noel W. Smith, C.E., Assistant Supervisor N. C. Ry., York, Pa. Residence: 26 East Philadelphia Street.

Edward Augustus Soleliac, B.S. (in Metallurgy), Assistant Superintendent Adelaide Silk Mills, Allentown, Pa. Residence: 132 North 4th Street.

George Stern, B.A., Attorney-at-Law, Philadelphia, Pa. Permanent address: Frostburg, Md.

William Remick Stinemetz, E.E., 1531 P. Street, Washington, D. C.

Thomas Harrison Symington, M.E., Assistant Superintendent, Richmond Locomotive Works, Richmond, Va. Residence: 509 East Grace Street.

John Taylor, A.C., 244 Market Street, Bethlehem, Pa.

Lewis Esler Troutman, E.E., Testing Department, General Electric Co., Schenectady, N. Y. Residence: 563 Liberty Street.

Fred Conover Warman, C.E., Assistant Engineer, United States Engineer Office, Washington, D. C. Residence: 3225 16th Street, N. W.

CLASS OF 1894.

William A. Allgaier, B.S., E.M. ('95), associated with Williams & Ulmer, Limited, Manufacturing Silversmiths, 1323 Walnut Street, Philadelphia, Pa. Residence: 256 Sumac Street.

William Conklin Anderson, E.E., Superintendent at Red Bank, N. J., for the Consolidated Gas Company of New Jersey. Residence: Riverside Avenue, Red Bank.

George Washington Scott Baton, B.S. (in Mining), Division Engineer with H. C. Frick Coke Co., Scottdale, Pa.

Irvin Isaac Beinhower, M.E., Draftsman, Lincoln Iron Works, Rutland, Vt. Residence: Brock House.

Thomas Joseph Bray, jr., M.E., Secretary and Mechanical Engineer, McGill & Co., Engineers and Machinists, 27th and Smallman Sts., Pittsburg, Pa.

Lawrence Calvin Brink, C.E., 166 West 126th Street, New York City. Employed by N.Y.C. & H.R.R.R. Co.

Rezeau Blanchard Brown, M.E., Works Superintendent, Market Street Gas Works, Newark, N.J.

Emott Davis Buel, C.E., Chief of Hydrographical Party, U.S. Army Engineer Corps, Hudson River Improvement, 51 State Street, Albany, N.Y. Residence: 21 South Hawk Street.

James Lindsey Burley, C.E., Civil Engineer, associated with Nathan F. Barrett, Landscape Architect, 50 Wall St., New York City. Residence: 19 West 38th St.

William Colwell Carnell, A.C., Chemist, Nelson Morris & Co., U.S. Yards, Chicago, Ill. Residence: 3232 Wabash Avenue.

Thomas Francis Carroll, B.S. (Latin Sci.), 166 York Street, New Haven, Conn.

Alden Brown Diven, C.E., with the La France Fire Engine Co., Elmira, N. Y. Residence: 957 Lake St.

Walter Jules Douglas, C.E., Engineer with L. V. Coal Co., Hazleton, Pa.

Walter Sewell Dunscomb, C. E., Draftsman, Building Division, Carnegie Steel Co., Pittsburg, Pa. Residence: Oakmont, Pa.

Thaddeus Percival Elmore, C.E., Assistant Manager, Havana Bridge Works, Montour Falls, N. Y. Permanent address: 109 W. Chemung Place, Elmira, N.Y.

Theodore Gwathmey Empie, E.E., Engineering Department, N.Y. and N.J. Telephone Co., 16 Smith Street, Brooklyn, N.Y.

Frank Faust, E.E., Draftsman, with The Jackson & Woodin Mfg. Co., Berwick, Pa.

James DuBose Ferguson, C.E., in charge of Engineer Corps, making right-of-way survey, Belvidere Division, P. R. R., Lock Box 78, Phillipsburg, N. J. Permanent address: Office of Broad Street Station, Penna. R. R., Philadelphia, Pa.

Robert Ferriday, C.E., Assistant on Engineering Corps, E. & A. Division, Pennsylvania Co., Lawrence Junction, Pa. Residence: 72 North Street, New Castle, Pa.

Richard Daniel Floyd, A.C., Manager Floyd Bros. & Co., Converters of Cotton Goods, 187–189 Market Street, Chicago, Ill. Residence: 5426 Jefferson Avenue.

John Jacob Frank, E.E., General Electric Co., Schenectady, N. Y. Residence: 442 State Street.

Luther L. Gadd, E.E., Estimating Department, Levering and Garrigues, 552–554 West 23d Street, New York City. Residence: 63 West 50th Street.

Frank Wieseman Glading, M.A. (Phila. Central High School), M.E., M.S. (Cornell), Electrician for the Edison Manufacturing Co., Orange, N. J. Residence: West Orange. Permanent address: 2005 East York Street, Philadelphia, Pa.

Milton Brayton Graff, A.C., Asst. Chemist for Proctor & Gamble Co., Ivorydale, O. Residence: Forest Avenue, Avondale, Cincinnati, O.

Elwood Aristides Grissinger, E.E., Electrical Engineer and Salesman, Westinghouse Electric and Manufacturing Co., Syracuse, N. Y.

Bayard Guthrie, M. E., Superintendent, A.M. Guthrie & Co., 21st and Smallman Streets, Pittsburg, Pa. Residence: 5978 Alder Street, E.E.

William McCleery Hall, M.A. (Franklin & Marshall), C.E., Assistant Master, Yeates Institute, Lancaster, Pa. Residence: 30 West King Street.

Fletcher Dickerman Hallock, E.E., Electrical Engineering, No. 308 West 5th Street, Plainfield, N. J.

Arthur Williston Henshaw, E.E., Engineering Department, General Electric Co., Schenectady, N. Y. Residence: 8 Union Street.

Anton Yost Hesse, C.E., with the Shiffler Bridge Co., Pittsburg, Pa. Residence: 6414 Howe St.

Foster Haven Hilliard, C.E., U. S. Dredging Fleet, Mississippi River Improvement, New Madrid, Mo. Permanent address: Monroe, N. C.

William Emley Holcombe, E.E., with the General Electric Co., Schenectady, N. Y.

Matthias Harry Holz, M.E., Graduate Student in Electricity, Univ. of Pa. Residence: 1514 Brown Street, Philadelphia, Pa.

Alfred A. Howitz, M.E., Box 628, Newport News, Va.

George Washington Hunsicker, A.C., Teacher of Elementary Sciences in the Allentown High School. Residence: 119 North 13th Street.

George Cass Hutchinson, M.E., Cass Realty Corporation, 209 East 23d Street, New York City. Residence: South Orange, N. J.

Arthur Bacon Jones, A.C., Assistant Chemist, P. R. R., Altoona, Pa. Residence: 917 Lexington Avenue.

Barry Holme Jones, B.S., E.M. ('95), Instructor in Mechanical Engineering, Lehigh University. Address: Bethlehem, Pa.

William Harrison Kavanaugh, M.E., Instructor in Mechanical Engineering, University of Illinois, Urbana, Ill.

Richard Warren Knight, C.E., Engineering Department, Shiffler Bridge Co., Pittsburg, Pa.

Claude Averett Langdon, C.E., Draftsman, Pennsylvania Steel Co., Steelton, Pa. Address: 111 Locust Street, Harrisburg, Pa.

Harry Donaldson Leopold, C.E. Draftsman, Phœnix Bridge Co., Phœnixville, Pa.

James Edwin Little, M.E., Draftsman, Bethlehem Iron Co. South Bethlehem, Pa. Residence: Hokendauqua, Pa.

Clarence Oliver Luckenbach, M.E., with Hale & Kilburn Mfg. Co., 48–50 North 6th Street, Philadelphia, Pa. Residence: 1718 North 15th Street. Home address: 7 Broad Street, Bethlehem, Pa.

Matthew McClung, jr., B.S. (in Metallurgy), Chemist, Carrie Furnace Co., Rankin, Pa.

John Douglas McPherson, E.E., 1240 19th Street, N. W., Washington, D. C.

John Van Sickle Martenis, M.E., with Terminal R. R. of the B. W. & W. Co., Pier 8, Robert Stores, Brooklyn, N. Y. Residence: 464 9th Street.

Joseph Oscar Mathewson, B.S. (in Metallurgy), Chemist for Ashland Coal & Iron Railway Co., Ashland, Ky.

William Spencer Merrill, B.A., LL.B. (Cincinnati Law School), Devon Inn, Los Angeles, Cal.

Walter Hurxthal Miller, M.E., of the firm of Redding & Miller, Electrotypers and Manufacturers of Printers' Metal Furniture, 66–72 New Jersey Railroad Ave., Newark, N. J.

Charles Asher Moore, E.E., Hammonton, N. J.

Julius Lederer Neufeld, E.E., Instructor in Mathematics,

Central High School, Philadeiphia, Pa. Residence: 1909 South Broad Street.

Carl William Frederick Neuffer, C.E., Transitman for the Pennsylvania Coal Co., Dunmore, Pa. Residence: 811 Prescott Avenue, Scranton, Pa.

Charles Atwood Newbaker, E.E., with the Bell Telephone Co., Philadelphia, Pa. Residence: 1333 Arch street.

Richard Leslie Ogden, A.C., Lehigh Valley Coal Co., Hazleton, Pa.

Jeremiah Francis O'Hearn, C.E., Shenandoah, Pa.

Godwin Ordway, B.S. (in Metallurgy), Assayer and Mining Engineer, Rossland, British Columbia. Permanent address: 702 17th Street, Washington, D. C.

William Arthur Payne, B.S. (in Architecture), Assistant Engineer, care of Ernest Flagg, Architect, 35 Wall Street, New York City. Mailing address: 147 West 105th Street.

William Vaughan Pettit, B.S. (in Metallurgy), Director of Manufacture of Clay Products of Staten Island Terra Cotta and Lumber Co. Residence: 79 Water Street, Perth Amboy, N. J.

Stephen Collins Potts, A.C., Assistant Chemist, P. R. R., Altoona, Pa. Residence: 933 16th Street.

Thomas Charles Roderick, E.E., care of D. C. Street Railway Co., 12 Woodward Avenue, Detroit, Mich.

Frank William Roller, M.E., of the firm of Machado & Roller, Electrical Engineers and Contractors, 203 Broadway, New York City.

Charles Beecher Rutter, B.S. (in Mining), Engineer Corps, Lehigh Coal and Navigation Co., Lansford, Pa.

Herman Schneider, B.S. (in Architecture), Architect, Walsh Building, Cumberland, Md.

Benjamin Ferdinand Schomberg, M.E., apprentice, P. R. R. Machine Shops, Altoona, Pa. Residence: 1209 16th Street.

Edgar Earnest Seyfert, C.E., Draftsman, Pottsville Iron and Steel Co., Pottsville, Pa.

George Elwood Shepherd, E.E., of the firm of Shepherd

& Rust, Electrical Engineers, 19–21 North Franklin Street, Wilkes-Barre, Pa.

Charles Elder Shipley, E.E., Garrison, Md.

Robert Eugene Smith, M.E., Draftsman, Bethlehem Iron Co. Residence: 135 Broad Street, West Bethlehem, Pa.

Herbert Ridley Stratford, A.C., Secretary, The George Stratford Oakum Co., Jersey City, N. J. Residence: 574 Garfield Avenue.

Walter Christian Schwartz, M.E., No. 525 Turner Street, Allentown, Pa.

Frederick George Sykes, E.E., Superintendent Electrical Plant, Edison Electr. Ill. Co. of Brooklyn, 360 Pearl Street, Brooklyn, N. Y.

Charles Hamilton Thompson, B.S. (in Metallurgy), Asst. to Mining Engineer, Sunday Creek Coal Co., Corning, Perry Co., O.

Philip Henry Trout, jr., E.E., Staunton, Va.

Orson William Trueworthy, M.E., Norfolk Navy Yard, Va.

Clarence Porter Turner, E.E., Wilkes-Barre, Pa.

Charles W. Underwood, E.E., Special Agent Wayleaves Department, New York Telephone Co., 15 Dey Street, New York City.

Jacob Daniel Von Maur, C.E., Superintendent of the Lawrence Harbor and Improvement Co., Lawrence, N. J. Address: Cliffwood, N. J.

Edward Olmstead Warner, E.E., Assistant Inspector of Railway Material for Japanese Government, 25 Capitol Avenue, Hartford, Conn.

Ruel Chaffee Warriner, B.S. (in Mining), Transitman, Lehigh Valley Coal Co., Hazleton, Pa.

Aubrey Weymouth, C.E., with Post & McCord, Engineers and Contractors, 287 Fourth Avenue, New York City. Residence: 210 West. 38th Street.

Thomas William Wilson, C.E., Engineer, Charleston City Ry. Co., Charleston, S. C.

Weldon Burris Wooden, C.E., Hampstead, Md.

CLASS OF 1895.

Herman Leon Arbenz, C.E., Drafting Department, The Pittsburg Bridge Co., 38th Street and A. V. R. R., Pittsburg, Pa. Residence: 5169 Penn Avenue.

Chester Terrill Ayres, E.E., with the People's Gas, Light and Coke Co., Natural Gas Department, 2–4 East Madison Street, Chicago, Ill. Residence: 4410 Berkeley Avenue.

Franklin Baker, jr., B.S. (in Mining), 2020 North 22d Street, Philadelphia, Pa.

Clarence Kemble Baldwin, M.E., Mechanical Engineer's Office, Lehigh Valley Coal Co., Box 286, Wilkes-Barre, Pa. Home address: 1900 Wallace Street, Philadelphia, Pa.

Anthony Francis Bannon, jr., C.E., Assistant City Engineer, Bradford, Pa. Residence: 133 Congress Street.

John Collinson Barber, C.E., Levelman Rocky Mountain Section, U. S. Geological Survey, Thatcher, Col. Permanent address: Conaways, Md.

Robert Josiah Bartholomew, M.E., Bath, Pa.

Rollin Calvert Bastress, C.E., with the Berlin Iron Bridge Co., East Berlin, Conn.

Harry Wilber Beach, M.E., General Manager for H. L. Beach, Manufacturer of Wood-working Machinery, Montrose, Pa.

George Wallace Beggs, C.E., with the Berlin Iron Bridge Co., East Berlin, Conn. Permanent address: 142 North 10th Street, Reading, Pa.

John Henry Best, C.E., Granville, Pa.

Ernest Mar Blehl, E.E., Private Secretary to Superintendent, Western Union Telegraph Co., 1000 Chestnut Street, Philadelphia, Pa. Residence: 601 Oak Lane, Oak Lane Station.

William Bowie, B.S. (Trinity), C.E. ('95), Aid, U. S. Coast and Geodetic Survey, Washington, D. C. Permanent address: Annapolis Junction, Maryland.

Charles Sumner Bricker, M.E., Testing Laboratory of the Chicago, Burlington and Quincy R. R., Aurora, Ill.

Robert Bruce Brinsmade, B.S. (Washington University. St. Louis), E.M. ('95), Draftsman, Parrot Copper Co., Parrot, Mont.

*James Emery Brooks, M.E., 154 Prospect Street, East Orange, N. J.

Eugene Clare Brown, E.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 7 Quincy Street, N. E.

Wiliam Henry Brown, B.S., E.M. ('96), with the Engigineer Corps of the Philadelphia and Reading Coal and Iron Co., Shamokin, Pa. Permanent address: Ellangowan, Shenandoah P. O., Pa.

Walter Turpin Brown, C.E., Bridge and Construction Department, Pencoyd Iron Works, 154 West Chelten Avenue, Germantown, Pa. Permanent address: Centreville, Md.

James Hodgson Budd, C.E., Draftsman and Computer on Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa.

Charles Calvin Burgess, C.E., Union Bridge Co., Athens, Pa.

John Thomas Callaghan, jr., B.S., E.M. ('96), Assistant Inspector of Steel for the U. S. Navy Department, stationed at Works of Bethlehem Iron Co., South Bethlehem, Pa. Residence: 123 South High St., Bethlehem.

Francis Lee Castleman, C.E., with Post & McCord, Engineers and Contractors, 287 Fourth Avenue, New York City.

Robert Edes Chetwood, jr., E.E., Engineer's Department, American Telephone and Telegraph Co., 151–153 Cedar Street, New York City. Residence: 415 North Broad Street, Elizabeth, N. J.

Arthur Stebbins Clift, M.E., General Electric Co., Schenectady, N. Y.

William Wheeler Coleman, B.S. (in Metallurgy), with the Bethlehem Iron Co., South Bethlehem, Pa.

William Joseph Collier, C.E., Draftsman, B. & C. Department, Pennsylvania Steel Co., Steelton, Pa.

Morris Llewellyn Cooke, M.E., of the firm of Cooke, Beaumont & Co., Printers and Publishers, 105 North Front Street, Philadelphia, Pa. Residence: 1025 Walnut Street.

Herbert Maurice Crawford, C.E., Engineering Corps, with the H. C. Frick Coke Co., Scottdale, Pa.,

Henry M. S. Cressman, B. A., Principal of Public Schools, Egg Harbor City, N. J.

Howard Stephen Deck, M.E., Mechanical Engineer, Laflin & Rand Powder Co., 99 Cedar Street, New York City. P. O. Address: Mountain View, N. J.

Henry DeHuff, E.E., with D'Olier Engineering Co., 129 South 11th Street, Philadelphia. Residence: 806 North 16th Street.

Stanley Chipman deWitt, E.E., Inspector, Maintenance Department, Bell Telephone Co., Philadelphia. Residence: 813 North Broad Street.

James Chambers Dick, C.E., Engineer for Kansas and Texas Coal Co., Pittsburg, Kansas.

Beekman DuBarry, jr., M.E., Motive Power Department, Penna. R. R. Co., P. O. Box 112, Altoona, Pa. Permanent address: 1904 G Street, N. W., Washington, D. C.

Howard Eckfeldt, B.S., E.M. ('96), Mining Engineer and Surveyor for the Mazapil Copper Co., Limited, Concepcion del Oro (via Laredo and Saltillo), Zacatecas, Mexico.

Alfred William Alexander Eden, C.E., Draftsman, Union Bridge Co., Athens, Pa. Permanent address: Brown's Town, Jamaica, W. I.

Edward L. Faison, jr., C.E., Topographer on U. S. Geological Survey, Denison, Texas. Permanent ad-address: Elliott, N. C.

Guy Hector Farman, B.S. (in Metallurgy), 1838 Champa Street, Denver, Col.

Edward Calvin Ferriday, B.A., Sales-agent for Laflin & Rand Powder Co., of New York City, in charge of Nashville Branch Office. Residence: 149 North Market Street, Nashville, Tenn.

Walter Ferris, M.E., Assistant Chief Engineer, Pencoyd Iron Works, 3731 Ridge Avenue, Wissahickon, Philadelphia, Pa.

*George Lane Gabrio, E.E.

Andres Garza Galan, C.E., Surveying, Santa Rosa, Coali, Mexico.

Eduardo Antonio Giberga y Galé, M.E., Chief Engineer, Electrical Department, Spanish-American Light and Power Co., Consolidated, Monte 1, Havana, Cuba. Residence: Virtudes 2 A.

John Jameson Gibson, E.E., Inspector, First District, Long Distance Branch, American Telegraph and Telephone Co., 18 Cortlandt Street, New York City. Residence: 151 State Street, Brooklyn.

Elmer Grant Godshalk, A. C., Lansdale, Pa.

Wallace Russell Goss, C.E., Inspector and Rodman, U. S. Naval Station, Port Royal, S. C. Address: Box 313.

Frederick Taylor Haines, C.E., Attorney-at-Law, Elkton, Md.

Thomas Graham Hamilton, E.E., with the Consolidated Traction Co., Pittsburg. Residence: 5912 Margaretta Street.

Robert Rieman Harvey, E.E., Westinghouse Electric and Manufacturing Co., Pittsburg. Residence: 6730 McPherson Street, E. E.

Thomas Lloyd Henry, C.E., Klondike District, Alaska. Home address: 59 First Street, Troy, N. Y.

Howard Samuel Hess, B.A., law student, office of J. Davis Brodhead, Esq., South Bethlehem, Pa. Home address: Hellertown, Pa.

Ira Miller Higbee, C.E., with the White Deer Water Supply Co., Watsontown, Pa.

William Jacob Hiss, Jr., E.E., Construction Department, Metropolitan Telephone and Telegraph Co., 18 Cortlandt Street, New York City. Residence: 44 Munn Avenue, East Orange, N. J.

William Hopkins, E.E., Assistant Engineer, Carbonundum Co., Niagara Falls, N. Y.

* Deceased.

Drew William Irvine, E.E., Electrician, Roanoke Electric Light and Power Co., Roanoke, Va. Residence: 502 Church Avenue, S. W.

Charles Borrows Jacobs, A.C., Superintendent and Chemist of the Ampere Electro-Chemical Co., Ampere, N. J. Office, 39 Cortlandt Street, New York City.

Elmer Augustus Jacoby, B.A., Instructor in Mathematics, Perkiomen Seminary, Pennsburg, Pa.

William Agassiz James, B.S. (in Mining), Mining Engineer, The Forest Mining Co., Scranton, Pa. Address: Peckville, Pa.

Henry Scudder Jaudon, C.E., with Rittenhouse R. Moore, River and Harbor Improvement, Savannah, Ga. Residence: 207 Gwinnett Street, East.

Albert Beardsley Jessup, B.S., E.M. ('96), Engineering Department, Shamokin Division, Lehigh Valley Coal Co., Centralia, Pa.

Elisha Barton John, E.E., Assistant Engineer's Office, Tyrone Division, P. R. R., Tyrone, Pa. Permanent address; Bloomsburg, Pa.

Adolph Somers Kappella, E.E., with the Franklin Engineering Co., Philadelphia, Pa. Residence: 1100 North 40th Street.

Dixon Kautz, B.S. (Lat. Sci.), with Wallace & Kleeb, Wholesale Lumber, Tacoma, Washington.

Warren Byron Keim, C.E., Instructor in Civil Engineering, Lehigh University, South Bethlehem, Pa. Summer address: 612 Franklin Street, Reading, Pa.

Henry Edward Kip, B.S. (in Architecture), Architect, East Aurora, Erie County, N. Y.

David Henshey Lackey, E.E., Altoona, Pa.

William Allen Lambert, B.A., Student of Theology, Lutheran Seminary, Mt. Airy, Pa.

Louis Edgar Lannan, E. E., 52 I Street, N. W., Washington, D. C.

Arthur Hughes Lewis, B.S., E.M. ('96), with the L. V. Coal Co., Engineering Department, Wilkes-Barre, Pa. Residence: Plains, Pa.

Gerald Lewis, A.C., Assistant Chemist, Bethlehem Iron Co. Residence: Chi Phi House, South Bethlehem, Pa.

Benjamin W. Loeb, A.C., Chemist and Assayer, H. C. Harrison, Mining Engineer, Cerrabro, Nuevo Leon, Mexico. Permanent address: 346 Penn Street, Reading. Pa.

Theodore Philip Lovering, E.E., Maintenance Department, New York Telephone Co. Residence: 212 Schermerhorn Street, Brooklyn, N. Y.

Robert A. McKee, M.E., with the Kellogg Machine and Boiler Works, Athens, Pa.

Fayette Avery McKenzie, B.E. (Sci.), in charge of English and German, Department of Modern Languages, Juniata College, Huntingdon, Pa.

Stuart Tuttle McKenzie, C.E., with the Shiffler Bridge Co., 1123 Betz Building, Philadelphia, Pa.

Norman Peach Massey, C.E., with Milliken Brothers, Civil Engineers and Contractors, 39 Cortlandt Street, New York City. Residence: 327 West 124th Street.

Charles Frazier Maurice, C.E., with Bailey & Co., 51 E. 44th St., New York City.

John Samuel Miller, M.E., Mine Surveyor for the Mazapil Copper Co., Ltd., Concepcion del Oro (via Laredo and Saltillo), Zacatecas, Mexico.

Archibald D. Morris, M.E., Bristol, Pa.

William Spencer Murray, E.E., care of Westinghouse Electric and Manufacturing Co., Pittsburg, Pa.

Robert Neilson, jr., C.E., Assistant Supervisor, P. & E., and N. C. Railroads, Williamsport, Pa. Residence: Park Hotel.

James Harry Philips, C.E., Draftsman, Engineering Corps, Philadelphia Division, P. R. R., 5425 Merion Avenue, Philadelphia, Pa. Permanent address: Atglen, Pa.

Joseph Philips, jr., B.S., E.M. ('96), care of Berry De Moville & Co., Nashville, Tenn.

John Livingston Poultney, M.E., Assistant Inspector of Ordnance, Works of Robert Poole & Son Co., Baltimore, Md. Address: 263 West Hoffman Street.

Henry Crider Quigley, E.E., Resident Manager for Northern Ohio of The Security Trust Co. of Philadelphia. Office: 923 Garfield Building, Cleveland, O. Residence: Euclid Avenue, Southwest corner Erie.

William Reinecke, jr., B.S. (in Architecture), Architect, member of firm of Wilson & Reinecke, Northeast corner 6th and Market Streets, Louisville, Ky. Residence: 954 5th Street.

Eugene Jesse Rights, C.E., with the Engineering Department of the New York and Ottawa R. R. Company. Address: care of Rev. T. M. Rights, Moravian Town, Ontario, Canada.

Herbert Timothy Rights, C.E., Draftsman and Computer, Chief Engineer's Office, L. V. R. R., South Bethlehem, Pa. Residence: 19 Cedar Street, Bethlehem.

Samuel Neely Riter, M.E., Field Engineer for Riter-Conley Co., care of Manitoba Electric and Gas Light Co., Winnipeg, Manitoba. Permanent address: 56 Water Street, Pittsburg, Pa.

Eugene Schwinghammer, E.E., 409 7th Street, S. W., Washington, D. C.

Henry Kent Seltzer, C.E., Instrument-man, Engineer Corps, K. C., P. & G. Ry., Lake Charles, La. Permanent address: Ephrata, Pa.

John Egbert Shero, A.C., Chemist, Pittsburg Reduction Co., Niagara Falls, N. Y. Residence: 338 First Street. Permanent address: Fredonia, N. Y.

Robert S. Siegel, B.A., Bethlehem, Pa.

Edwin Harrison Sigison, E.E., City Inspector of Public Lighting, Room 7, City Hall, Buffalo, N. Y. Residence: 57 Norwood Avenue.

John Blake Slack, E.E., Law Student, Mt. Holly, N. J.

Edward George Steinmetz, E.E., Assistant to Superintendent, Electric Storage Battery Company, 19th Street and Allegheny Avenue, Philadelphia, Pa. Residence: 1609 North 15th Street.

John Eugene Stocker, B.S. (Sci.), Professor of Sciences The Western Military Institute, Upper Alton, Ill.

Robert Melvin Tarleton, B.S. (in Metallurgy), Metallurgical Engineer, Omaha, Neb. Address: Omaha Club.

Robert Sayre Taylor, B.S. (Sci.), Attorney at Law, First National Bank Building, Bethlehem. Pa.

Nathaniel Thurlow, A.C., 226 East Frederick Street, Lancaster, Pa.

Charles Frederick Townsend, B.S. (in Architecture), Draftsman for Brown & Von Beren, Architects, Exchange Building, New Haven, Conn. Residence: 322 George Street.

Joseph Boyer Townsend, E.E., Construction Department, Consolidated Traction Co., *Times* Building, Pittsburg, Pa. Residence: 238 Virginia Avenue.

John Frederick Van Benthem van den Bergh, C.E., Assistant Engineer, Madoera Railway, Bangkollon, Island of Madoera, Dutch East Indies.

Willard Randolph Van Liew, B.S. (in Metallurgy), Chemist, Electrolytic Refinery of Anaconda Copper Mining Co., Anaconda, Mont. Residence: The Montana.

Charles Henry Vansant, C.E., with William P. Field, C.E., 823 Prudential Building, Newark, N. J.

William Warr, E.E., Engineer for D'Olier Engineering Co., 129 South 11th Street, Philadelphia, Pa. Residence: 436 North 34th Street.

Fred Irving Wheeler, C.E., Water Works Department, City Engineer's Office, Pawtucket, R. I. Residence: 240 Chestnut Street, Clinton, Mass.

Harry Amasa White, E.E., with White & Bro., Smelters and Dealers in Metals, 1505 East Montgomery Avenue, Philadelphia, Pa. Residence: 1654 Vienna Street.

John Crum Whitmoyer, E.E., Dynamo Testing Department, Westinghouse Electric and Manufacturing Co., East Pittsburg, Pa. Residence: 1215 Wood Street, Pittsburg, Pa. (Station D). Permanent address: 710 North 6th Street, Harrisburg, Pa.

Edward Newton Wigfall, A.C., with William Waterall & Co., Philadelphia, Pa. Residence: 1822 Arch Street.

John Marion Wilson, C.E., P. R. R. Engineering Corps, care of C. S. D'Invilliers, Altoona, Pa.

Harold Lawden Wood, A.C. Analytical Chemist, 524 West 26th Street, New York City. Residence and permanent address: Upper Montclair, N. J.

Carlos Yglesias, B.S., E.M. ('96), San José, Costa Rica.

CLASS OF 1896.

William James Adams, jr., E.E., with the General Electric Co., Schenectady, N. Y. Residence: 212 Union Street.

William Stewart Ayars, M.E., Junior Engineer on board steamship "Illinois," Red Star Line, care of International Navigation Co., 305 Walnut Street, Philadelphia, Pa. Permanent address: 82 Dana Street, Wilkes-Barre, Pa.

Hobart Bentley Ayers, M.E., with the Schenectady Locomotive Works, 621 Union Street, Schenectady, N. Y. Permanent address: Westerly, R. I.

Albert Doane Ayres, C.E., with Sargent and Lundy, Mechanical and Electrical Engineers, Monadnock Block, Chicago, Ill.

Arthur Davidson Badgley, E.E., with the General Electric Co., Schenectady, N. Y. Residence: 208 Liberty Street.

Francis Hoskins Baldwin, E.E., Machinist, Shops of N. Y., N. H. & H. R. R., 260 Crown Street, New Haven, Conn.

Hasell Wilson Baldwin, M.E., Apprentice, P. R. R. Shops, Altoona, Pa. Residence: 1428 Eighth Avenue.

L. Warrington Baldwin, C.E., with the Illinois Central R. R., Fulton, Ky. Permanent address: Waterbury, Md.

Springfield Baldwin, C.E., Draftsman, Ramapo Iron Works, Hillburn, N. Y. Address: P. O. Box 45.

George Pomeroy Bartholomew, B.S. (in Metallurgy), with McDonald and Sayre, Contractors, Hazleton, Pa.

Frederick Rawdon Bartles, C.E., Rodman P. & E. and N. C. Railways, 955 West 4th Street, Williamsport, Pa.

Charles C. W. Bauder, E.E,, Traffic Department, New York Telephone Co., 15 Dey Street, New York City.

Fairfax Bayard, C.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 1908 3d Street, N. W.

Herbert Huebener Beck, A.C., Chemist, Miller Soap Co., Lancaster, Pa. Residence; 20 South Prince Street.

Edgar Tweedy Belden, C.E., care of Parsons and Belden, Civil and Sanitary Engineers, Stamford, Conn.

Moriz Bernstein, C.E., employed on Nicaragua Canal Survey. Address: care of Nicaragua Canal Commission, Army Building, New York City.

Warren Joshua Bieber, B.A., 25 North Linden Street, Bethlehem, Pa.

Daniel William Bliem, C.E., Assistant to Engineer of Bridges, B. & O. R. R., Mount Royal Station, Baltimore, Md. Residence: 203 Orbison Avenue, Roland Park.

Benjamin Franklin Bossert, C.E., with the Phœnix Bridge Co., Phœnixville, Pa.

Howard Franklin Boyer, B.S. (Sci.), Springtown, Pa.

Edward Elisha Bratton, C.E., Assistant Engineer, Lake Superior Power Company, Saulte Ste. Marie, Mich.

Frank Shepard Bromer, M.E., Apprentice, L. V. R. R. Shops, Easton, Pa. Address: 234 Bushkill Street.

Maximilian Joseph Bucher, A.C., Instructor in Chemistry, Lowell Textile School, Lowell, Mass. Permanent address: Columbia, Pa.

George Amandus Buvinger, M.E., Latrobe Steel Works, Melrose Park, Ill. Permanent address: 29 Marshall Street, Dayton, O.

Aaron Beaumont Carpenter, E.E.. Avondale, Pa.

Malcolm Carrington, E.E., Electrical Engineer with the Richmond Railway and Electric Co., Richmond, Va. Address: 1316 Grove Avenue.

Frank Leslie Cooke, E.E., with New York Telephone Co., 874 Broadway, New York City.

Eckley Samuel Cunningham, M.E., Mechanical and Elec-

trical Engineer for the Choctaw, Oklahoma and Gulf R. R., South McAlister, Indian Territory.

Samuel Philip Curtis, M.E., Works Manager, Front Street Works, The Newark Gas Co., 26 Front Street, Newark, N. J.

Frederic Allyn Daboll, C.E,, with Stewart & McDermott, Bridge Contractors, New York. Present address: Box 157, New Bedford, Mass.

John William Dalman, M.E., L. V. R. R. Co., 46 South 4th Street, Easton, Pa.

Samuel Moses Dessauer, B.S. (in Architecture), Chief Engineer's Office, L. V. R. R. Co., South Bethlehem, Pa. Residence: 501 West 4th Street. Permanent address: Montrose, Pa.

William Carter Dickerman, M.E., Milton Car Works, Milton, Pa.

Frank Oliver Dufour, C.E. Assistant in Civil Engineering, Lehigh University, South Bethlehem, Pa. Residence: 523 Cherokee Street.

Edward Miall Durham, jr., C.E., with the U. S. Deep Waterways Commission, Cohoes, N. Y. Permanent address: Vicksburg, Miss.

Edward Hiram Dutcher, jr., M.E., Buffalo Forge Co., Buffalo, N. Y. Residence: 663 Elm Street.

Timothy Sharpe Eden, E.E., with the General Electric Co., Schenectady, N. Y. Residence: 208 Liberty Street.

George Ramsey Enscoe, C.E., Estimater for Shiffler Bridge Co., Pittsburg, Pa. Home address: 57 Lincoln Avenue, Bennett, Pa.

William Alvin Evans, B.S. (in Metallurgy), Summit Hill, Pa.

Charles Victor Ferriday, M.E., with the St. Anthony Falls Water Power Co., Minneapolis, Minn.

Curtis Bertram Flory, E.E., Engineering Department, Link-Belt Engineering Company, Nicetown, Philadelphia, Pa.

Clarence Richard Fountain, E.E., Instructor, Bliss School of Electricity, 35 B Street, N. W., Washington, D. C.

Thomas Joseph Gannon, M.E., 422 Locust Street, South Bethlehem, Pa.

James Brown Given, E.E., Cashier, Citizens' Bank of Ponca City, Ponca City, Oklahoma Ty.

*John Savage Graff, E.E.

William Heald Groverman, M.E., Machinist Apprentice, C. & O. Ry., Huntington, W. Va. Residence: 925 Sixth Avenue.

David Hall, E.E., Purchasing Agent, Bullock Electrical Manufacturing Co., 1032 Broadway, Cincinnati, O.

Henry Neff Herr, C.E., Civil Engineer, 108 East King Street, Lancaster, Pa.

Howard Drysdale Hess, M.E., with the Pencoyd Iron Works, Pencoyd, Pa. Residence: 1829 Master Street, Philadelphia, Pa.

Robert Parsons Howell, C.E., U. S. Surveyor, U. S. Geological Survey, Indian Territory Division, Denison, Texas.

William Steell Jackson, E.E., with the Southern Bell Telephone and Telegraph Co., Charleston, S. C.

Victor Albert Johnson, B.S. (in Metallurgy), Duncan City, British Columbia.

Victor Witmer Kline, C.E., Inspector of Construction, Department of Public Works, State of New York, stationed at Smith's Basin, N. Y. Permanent address: Box 1151, Lockport, N. Y.

Robert Edwin Kresge, A.C., Second Asssistant Chemist, Bethlehem Iron Co., South Bethlehem, Pa.

Robert Edward Laramy, B.A., Instructor, Senior Department, Moravian Parochial School, Bethlehem, Pa. Residence: 81 Broad Street.

Bruce Emerson Loomis, E.E., Manager, N. Y. and N. J. Telephone Co., W. New Brighton, Staten Island, N. Y.

Wheeler Lord, M.E., with Pennsylvania Bolt and Nut Co., Lebanon, Pa.

John Buckley MacBride, C.E., Engineer in charge of construction of Pochuck R. R., Deckertown, N. J.

* Deceased.

Clifford Sherron MacCalla, E.E., Assistant to Superintendent, Electrical Plant, Edison Elec. Ill. Co., 360 Pearl Street, Brooklyn, N. Y. Residence: 272 Ryerson Street.

Victor Emanuel Masson, A.C., Chemist to the Pleasant Valley Wine Co., Rheims, N. Y. Home address: Hammondsport.

Edward Williamson Miller, B.S., E.M. ('97), with the New Jersey Zinc Co., Newark, N. J. Residence; 207 Summer Avenue.

Rafael de la Mora, M.E., Consulting Mechanical Engineer, Agent for the American Engineering Co., etc., Guadalajara, Mexico.

Charles Howard Morgan, E.E., Assistant District Inspector for the Southern Bell Telephone Co., Richmond, Va.

William Hitz Mussey, E.E., Draftsman, Baldwin Locomotive Works, 500 North Broad Street, Philadelphia, Pa.

John Henry Myers, C.E., Lewistown, Pa.

Franklin Oberly, E.E., Easton. Pa.

Walter Raleigh Okeson, C.E., Engineer, South Penn Oil Co., Mannington, W. Va.

Louis Atwell Olney, A.C., Principal, Department of Chemistry and Dyeing, Lowell Textile School, Lowell, Mass. Permanent address: Providence, R. I.

Horace Lucius Palmer, C.E., U. S. Surveyor on U. S. Geological Survey in Indian Territory. Address: Denison, Texas.

Jacob Grafius Petrikin, B.S. (in Architecture), Lock Haven, Pa.

Morris Wright Pool, M.E., 936 S Street, N. W., Washington, D. C.

James Lee Rankin, jr., M.E., with Julian Kennedy, Consulting Engineer, Vandergrift Building, Pittsburg, Pa. Residence: 225 Emerson Street.

Henry Paul Reed, E.E., Calculating Department, General Electric Co., Schenectady, N. Y. Residence: 212

Union Street. Permanent address: care of Lieut. H. A. Reed, War Department, Washington, D. C.

Homer Austin Reid, C.E., with the Youngstown Bridge Co., Youngstown, O. Permanent address: 111 North Chestnut Street, Warren, O.

George Homer Ruggles, C.E., Engineer Corps, Illinois Central R. R., Belleville, Ill. Permanent address: Cherokee, Ia.

Clement Clarence Rutter, C.E., Lansford, Pa.

John Cornelius Sesser, C.E., St. Joseph, Mich.

*Arthur Yeager Shepherd, M.E.

Luther D. Showalter, C.E., Pottstown, Pa.

Henry Shriver, M.E., Engineer for Union Mining Co., Mt. Savage, Md.

Edward Stewart Taylor, M.E., Draftsman, Fort Wayne Electric Corporation, Fort Wayne, Ind. Residence 407 Fairfield Avenue.

William Bailey Taylor, E.E., Electrician, in charge of Telephone Exchange, Rochester Telephone Co., Rochester, Minn. Permanent address: 81 Market Street, Bethlehem, Pa.

John Augustus Thomson, B.S., E.M. ('97), Summit Point, W. Va.

Edward Coppée Thurston, B.S. (in Metallurgy), Student: School of Mines, Freiberg, Saxony, Germany.

Joseph Wharton Thurston, B.A., Physical Laboratory, Bethlehem Iron Co., South Bethlehem, Pa. Residence: 311 Cherokee Street.

Curtis Edwards Trafton, E.E., 90 Franklin Street, Fall River, Mass.

Harry Conklin Tripp, M.E., with the General Electric Co., Schenectady, N. Y. Permanent address: Millerton, N. Y.

John Scofield Wallace, B.S. (in Metallurgy), New Castle, Pa.

Ulysses Grant S. Walters, C.E., Pottstown, Pa.

* Deceased.

Harry Dallam Webster, M.E., Draftsman, Dickson Locomotive Works, Scranton, Pa. Residence: 636 Adams Avenue.

Frank Thomas Weiler, C.E., U. S. Engineer's Office, Philadelphia, Pa. Residence: 2416 Master Street.

Davis Sanno Williams, B.S. (in Architecture), Fort Snelling, Minn.

David William Wilson, jr., B.S. (in Architecture), with Geo. Edw. Harding and Gooch, Architects, Postal Telegraph Building, New York City. Residence: 381 Greene Avenue, Brooklyn.

J. Roberts Wilson, E.E., Engineer's Office, New York Telephone Co., 15 Dey Street, New York City.

Alfred Mahlon Worstall, E.E., Manager for G. S. W. Brubaker, Contracting Engineer, Newtown, Pa.

CLASS OF 1897.

Francis DuPont Ammen, M.E., with the Harlan and Hollingsworth Co., Shipbuilders, Wilmington, Ded.

Henry Jonathan Biddle Baird, B.S. (in Metallurgy), with the Orford Copper Co., Constable Hook, N. J. Residence: 100 Avenue D, Bayonne, N. J.

Lathrop Hutchings Baldwin, M.E., with the Ingersoll-Sergeant Rock-Drill Co., Easton, Pa. Residence: 155 Bushkill Street.

Charles Marshall Barton, C.E., with L. V. R. R. Engineer Corps, Waterloo, N. Y. Permanent address: Pikesville, Md.

Harry Layfield Bell, E.E., Norfolk, Va.

William Ragan Binkley, E.E., in charge of Switchboard, Mutual Automatic Telephone Co., Albuquerque, N. M. Permanent address: Hagerstown, Md.

Bertine Frederic Borhek, A.C., West Bethlehem, Pa.

Charles Schwartze Bowers, E.E., with J. F. Buchanan & Co., Electrical Contractors, Philadelphia, Pa. Residence: 1606 North 15th Street.

John Boyt, B.S. (in Metallurgy), Assistant in Metallurgy, Lehigh University. Residence: 431 Cherokee Street, South Bethlehem, Pa.

William Burke Brady, M.E., Harrisburg, Pa.
Walter Everette Brown, E.E., Stamford, Conn.
Sinclair Wiggins Chiles, C.E., Sims City, Florida.
Thomas Holland Clagett, B.S. (in Metallurgy), with the Qualey Chemical Co., Plymouth Meeting, Pa.
Barton Olmsted Curtis, C.E., Engineering Department, Philadelphia, Wilmington and Baltimore R. R., 216 Washington Street, Media, Pa.
Patrick Edward Dinan, A.C., Chemist, Alpha Portland Cement Works, Whitaker, N. J. Residence: 230 East 3rd Street, South Bethlehem, Pa.
Louis Diven, E.E., with the La France Fire Engine Co., Elmira, N. Y. Residence: 957 Lake Street.
Benjamin Irvin Drake, B.S. (in Metallurgy), with the Eynon-Evans Manufacturing Co., 15th and Clearfield Streets, Philadelphia, Pa.
Clifford George Dunnells, C.E., Draftsman, Pittsburg Bridge Co., 38th Street and A. V. R. R., Pittsburg, Pa.
Stuart Rhett Elliott, B.S. (in Metallurgy), Graduate Student, Lehigh University, South Bethlehem, Pa. Permanent address: Beaufort, S. C.
Albert Andrew Finkh, M.E., Assistant to Mechanical Engineer of the Pryibill Manufacturing Co., 512–524 West 41st Street, New York City. Permanent address: 214 Woodworth Avenue, Yonkers, N. Y.
Ira D. Fulmer, E.E., with the Princeton Telephone Co., 3 Nassau Street, Princeton, N. J.
Francisco Martinez Gallardo, M.E., Graduate Student, Lehigh University, South Bethlehem, Pa. Permanent address: Guadalajara, Mexico.
Orrin Satterlee Good, E.E., Lock Haven, Pa.
Ralph Scofield Griswold, E.E., Draftsman, Electrical Machine Works of E. G. Bernard & Co., Troy, N. Y. Residence: 43 Fourth Street. Permanent address: Madison, N. J.
William Thomas Hanly, C.E., 1802 Market Street, Philadelphia, Pa.

William Stephen Hiester, E.E., 813 North 2d Street, Harrisburg, Pa.

Ross Nathaniel Hood, E.E., Duncannon, Pa.

Henry Taylor Irwin, M.E., Rosedale Foundry Co., Allegheny, Pa. Residence: 15 North Avenue.

Arthur Perkins Jenks, E.E., Testing Department, Electric Storage Battery Co., 19th Street and Allegheny Avenue, Philadelphia, Pa. Residence: 3401 North 17th Street.

Harry Sackett Johnson, E.E., with the Niagara Falls Power Co., Niagara Falls, N. Y. Residence: 264 3d Street.

Henry Harrison Jones, C.E., Reading, Pa.

Lawrence Rust Lee, M.E., Shepherdstown, W. Va.

Telford Lewis, B.S. (in Metallurgy), with the Cambria Iron Co., Johnstown, Pa. Address: 124 Market St.

Charles Victor Livingston, E.E., Box 306, Kingston, N. Y.

Arthur Frost Loomis, E.E., with the New York Telephone Co., Traffic Department, 15 Dey Street, New York City.

Barry MacNutt, E.E., Graduate Student, Lehigh University. Residence: 27 South Linden Street, Bethlehem, Pa.

James Gordon Mason, E. M., with the Lehigh Valley Coal Co., Wilkes-Barre, Pa. Residence: West Pittston, Pa.

William Adams Megraw, M.E., Baltimore, Md.

Esteban A. Mercenario, C.E., Puebla, Mexico.

Thaddeus Merriman, C.E., employed on Nicaragua Canal Survey. Present address: care of Nicaragua Canal Commission, Army Building, New York City. Permanent address: South Bethlehem, Pa.

Frank Douglass Mount, C.E., with Thomas Rodd, Chief Engineer P. R. R. Lines West of Pittsburg, General Offices, Penn Avenue and 10th Street, Pittsburg, Pa. Permanent address: Manasquan, N. J.

Carl Pivany Nachod, E.E., with the Electro-Dynamic Co., 224 Chestnut Street, Philadelphia, Pa. Home ad- Address: Gleneside, Pa.

Henry H. Newton, M.E., 2043 Chestnut Street, Philadelphia, Pa. Permanent address: Guadalajara, Mexico.

Robert Collyer Noerr, C.E., Brookland, D. C.

Harry Richards Peck, M.E., Apprentice, D. L. & W. Shops, Scranton, Pa. Residence, 1523 Prince Street.

James Harkins Pennington, M.E., Baldwin Locomotive Works, Philadelphia, Pa. Residence: 219 DeKalb Square.

Morris Havens Putnam, M.E., with the Lehigh Construction Co., Limited, Massena, St. Lawrence Co., N. Y.

John Peake Reynolds, jr., M.E., draftsman, Maxwell Wyeth & Co., (Gas Engines), 65 Delevan St., Brooklyn, N. Y. Residence: 404 Quincy St. Permanent address: Charleston, S. C.

Samuel Stewart Riegel, M.E., with the Bethlehem Foundry and Machine Co., South Bethlehem, Pa. Residence: 523 Cherokee Street.

Eugene Peronnean Roundey, C.E., with W. S. Bacot, C.E., 1 Broadway, New York City. Residence: 100 West 85th Street.

Woodford Royce, M.E., Draftsman with the Morrison Co., Willimantic, Conn. Residence: 140 Church Street.

Auguste Leopold Saltzman, M.E., with Walter Scott & Co., Printing Machine Works, Plainfield, N. J. Residence: 231 East 6th Street.

Charles Fred. Sanders, C.E., Kutztown, Pa.

Charles Francis Scott, E.E., with the New York and Staten Island Electric Co., New York City. Residence: New Rochelle, N. Y.

Henry Hamilton Seabrook, E.E., Electrician for the New Jersey and Pennsylvania Concentrating Co., care of Thomas A. Edison, Edison, N. J. Permanent address: Beaufort, S. C.

Samuel Palmer Senior, C.E., with Sooysmith & Company, Consulting and Contracting Engineers, Cornwall, Ontario.

Arthur Harold Serrell, E.E., with the Wheeler Condensing and Engineering Co., Carteret, N. J. Residence: 122 Plainfield Avenue, Plainfield, N. J.

Frank Bradley Sheaffer, C.E., New Bethlehem, Pa.
John Leefe Sheppard, jr., M.E., Charleston, S. C.
Edward Peter Shuman, C.E., 129 South 5th Street, Allentown, Pa.
Jonathan Edward Slade, C.E., 292 Ohio Street, Chicago, Ill.
Francis Betts Smith, M.E., Hartford, Conn.
Harvey Wilson Sprague, M.E., Draftsman, Bethlehem Foundry and Machine Co., South Bethlehem, Pa.
Michael Thomas Stack, C.E., Engineering Corps, L. V. Coal Co., Lost Creek, Pa. Residence: 314 East Centre Street, Shenandoah, Pa.
Alvin Riegel Sterner, E.E., with the Strowger Automatic Telephone Exchange Co., 947–949 Rookery Building, Chicago, Ill. Permanent address: Bethlehem, Pa.
John Stewart, jr., B.S. (in Mining), Mining Engineer, Horatio, Jefferson Co., Pa.
Paul Beno Straub, E.E., with Fort Pitt Bridge Works, Canonsburg, Pa. Residence: 4921 Forbes Street, Shady Side, Pittsburg, Pa.
Thomas Cedwyn Thomas, B.S. (in Mining), Assistant in Mining Engineering, Lehigh University, South Bethlehem, Pa.
Wallace Treichler, C.E., in charge of construction, Rock Island Water Filtration Plant, Rock Island House, Rock Island, Ill. Permanent address: Elizabethtown, Pa.
William Edward Underwood, M.E., with F. R. Dravo & Co., Engineers and Contractors, Lewis Block, Pittsburg, Pa.
Harrison Ricord Van Duyne, E.E., City Engineer's Office, Newark, N. J. Residence: 800 Broad St.
Charles Parker Wagoner, C.E., Phœnixville, Pa.
John Eugene Weideman, E.E., Washington, D. C.
Gilbert Case White, C.E., with the Chesapeake and Ohio R. R. Permanent address: 1 Clay Street, Richmond, Va.
George Livingston Yates, E.E., with New York Telephone

Co., 15 Dey St., New York City. Residence: 318 West 57th St.

Ambrose Everett Yohn, M.E., with the Huntingdon and Broad Top Mountain Railroad and Coal Co. Residence: Saxton, Pa.

Frank Steinmetz Young, E.M., Plymouth Meeting, Pa.

The number of graduates is 960, degrees having been conferred as follows:

Upon graduates of the School of General Literature: B.A., 47; B.S., 22; Ph.B., 7; M.A., 9

Upon graduates of the School of Technology: C.E., 343; M.E., 195; B.M., 19; B.S. (in Mining and Metallurgy), 92; E.M., 72; E.E., 122; A.C., 92; B.S. (in Architecture), 11; M.S., 4; Ph.D., 2.

Of these, 9 have taken the degrees of B.A. and M.A.; 2 of B.S. and C.E.; 1 of B.S. and A.C.; 11 of B.M. and E.M.; 39 of B.S. and E.M.; 1 of B.M., E.M., and A.C.; 1 of B.S., E.M., and C.E.; 1 of C.E. and E.M.; 2 of A.C. and E.M.; 1 of A.C. and M.S.; 1 of B.S., E.M., and M.S.; 2 of A.C., M.S., and Ph. D. 920 graduates are still living.

ONE-YEAR COURSE IN ELECTRICITY.

Beginning with the year 1884–85, the University offered a special course in Electricity, covering one year's work. Those who completed this course received certificates but no degrees. In 1888, the full four-year course in Physics and Electrical Engineering, leading to the degree of E.E., was established, and the one-year course was withdrawn. The names of those who completed this course are not included in the Roll of Alumni, but are given here:

Elmer Ellsworth Boyer, '85, Foreman of Testing Department, General Electric Co., Lynn, Mass.

Albert Brodhead, '88, 121 South Centre Street, Bethlehem, Pa.

Edward Conner, '86, Philadelphia, Pa.

William Fairchild Dean, '88, Montreal Agent for Canadian General Electric Co., Ltd., 1802 Notre Dame Street, Montreal, Can. Residence: 351 Prince Arthur Street.

Horace Musser Engle, '85, (Economic Geology), Roanoke, Va.

Herman C. Frauenthal, '88, M.D., 214 East 50th Street, New York City.

Walter George Fuller, '87, Brattleboro, Vt.

John Wesley Hackney, '87, of the firm of Ashmead and Hackney, Civil Engineers and Surveyors, Room 42, Real Estate & Law Building, Atlantic City, N. J.

James Arthur Heaton, '86.

Richard Otto Albert Heinrich, '88, General Manager, European Weston Electrical Instrument Co., Ritterstrasse 88, Berlin, Germany.

William Hoopes, '86, Manager of Philadelphia office of The American Electrical and Maintenance Co., 44 North 4th Street, Philadelphia, Pa.

Joseph Allison Horner, '88.

William Henry Hubbard, '88, General Agent, Helios Electric Co., 1229 Callowhill Street, Philadelphia, Pa.

Walter Eugene Hyer, '86, Westfield. N. J.

Daniel Henry Jenkins, '88, M.D., 1932 North Main Avenue, Scranton, Pa.

Charles Leavitt Jenness, '85, Western Electric Co., Chicago, Ill.

William Sigler Jones, '87, Secretary, The Quaker City Electric Co., 237–239 Dock Street, Philadelphia, Pa. Residence: 5144 Wayne Avenue.

George Herman Koehler, '85, Standard Underground Cable Co., Pittsburg, Pa.

Robert McAllister Lloyd, '86, Electrical Engineer, 22 Broad Street, New York City.

Dion M. Martinez, jr., '87, Reading R. R. Co., Philipsburg, Centre Co., Pa.

Charles Jacob Meade, '86, Edison Electric Illuminating Co., 48 West 20th Street, New York City.

Charles Jacob Miller, '88.

James Leidy Moore, '88, Superintendent, The Moorestown Electric Light, Heat and Power Co., Moorestown, N. J.

George Harrison Neilson, '86, Supervisor, Division No. 3, Philadelphia Div., P. R. R., Parkesburg, Pa.

Horace Fields Parshall, '87, Edison General Electric Co., Schenectady, N. Y.

George Herbert Putnam, '85, Instructor in Physics and History, Texas School for the Deaf, Austin, Tex.

Charles Norris Robinson, '88, Insurance Agent, 420 Walnut Street, Philadelphia, Pa.

Harry Meyer Seitzinger, '88, Manager of Machine and Electrical Department, J. G. Seitzinger Screen and Machine Works, 6 Northampton St., Wilkes-Barre, Pa.

Arthur Douglas Spear, '87, Brush Electric Co., Cleveland, O.

Lewis Buckley Stillwell, '85, Electrical Director, Cataract Construction Co. and Niagara Falls Power Co. Niagara Falls, N. Y.

Charles Wesley White, '88.

George Henry Wolle, '87.

Hugh Carlyle Young, '88, Superintendent Wellsboro Electric Company, Wellsboro, Tioga County, Pa.

OFFICERS OF THE ALUMNI ASSOCIATION OF THE LEHIGH UNIVERSITY, 1897–98.

President:

ROBERT P. LINDERMAN, South Bethlehem, Pa.

Vice-President:

HOWARD H. MCCLINTIC, Pittsburg, Pa.
ARTHUR LONG, Wilkes-Barre, Pa.

Archivist:

EDWARD H. WILLIAMS, JR., Bethlehem, Pa.

Secretary and Treasurer:

HARRY H. STOEK, Scranton, Pa.

Honorary Alumni Trustees:

THOMAS M. EYNON, Philadelphia, Pa.
(Term expires June, 1898.)

GARRETT B. LINDERMAN, South Bethlehem, Pa.
(Term expires June, 1899.)

W. ARTHUR LATHROP, Wilkes-Barre, Pa.
(Term expires June, 1900.)

FRANK P. HOWE, Philadelphia, Pa.
(Term expires June, 1901.)

Executive Committee:

ROBERT P. LINDERMAN, *Chairman.*

THOMAS M. EYNON,
G. B. LINDERMAN,
W. A. LATHROP,
E. H. WILLIAMS, JR.
FRANK P. HOWE,
H. H. MCCLINTIC,
ARTHUR LONG,
HARRY H. STOEK.

CONTENTS.

Almanac.

Calendar, 3.

Board of Trustees, 4.
- Honorary Trustees, 4.
- Honorary Alumni Trustees, 5.
- Officers of the Board, 5.
- Executive Committtee, 5.
- Building Committee, 6.
- Comm. on College Administration, 6.

Faculty, 7.
- President and Professors, 7.
- Assistant Professors and Lecturers, 8.
- Instructors and Assistants, 9.
- Gymnasium Service, 11.
- Library Service, 11.

Origin and Design of the University, 12.

Tuition, 12.

Public Worship, 13.

Site, 14.

Buildings, 14.
- Packer Hall, 14.
- The Chemical Laboratory, 15.
- The Metallurgical Laboratory, 16.
- The Physical Laboratory, 16.
- Saucon Hall, 17.
- The Sayre Observatory, 17,
- The Packer Memorial Church, 17.
- The University Library, 17.
- The Gymnasium, 17.

Expenses of Students, 18.

Admission of Students, 19.
- Date of Examinations, 19.
- Character of Examinations, 20.
- Requirements for Admission, 20.
- Conditional Admission, 27.
- Special Students, 27.
- Admission to Advanced Standing, 27.
- Admission to Graduate Courses, 27.
- Preparatory School Certificates, 28.

Program of Studies, 29.
- THE SCHOOL OF GENERAL LITERATURE, 29.
  - The Classical Course, 39.
  - The Latin-Scientific Course, 44.
  - The Course in Science and Letters, 47.
- THE SCHOOL OF TECHNOLOGY, 51.
  - The Course in Civil Engineering, 51.
  - The Course in Mechanical Engineering, 56.
  - The Courses in Mining Engineering, 64.
  - The Course in Elect. Eng., 78.
  - The Course in Chemistry, 82.

Physical Culture, 90.

Graduating Theses, 90.

Diplomas and Certificates, 91.

Graduate Students, 91.

Graduate Degrees:
- Requirements for M. A., 91.
- Requirements for M. S., 91.

The University Library, 92.
- The Coxe Memorial Library, 93.

The Observatory, 94.

The University Museum, 94.

Summer School of Surveying 95.

Students' Societies, 96.

Founder's Day, 98.

The University Sermon, 98.

Theses presented by candidates for degrees in 1897, 98.

University Day, 104.
- Exercises of June 16, 1897, 104.
- Award of Wilbur Scholarship, 105.
- Award of the Wilbur Prizes, 105.
- Degrees Conferred, 106.

The Wilbur Scholarship, 106.

The Alumni Scholarship, 106.

The Henry S. Haines Memorial Scholarship, 107.

The Mercur Memorial Fund Scholarships, 107.

The Coxe Memorial Fund, 107.

The Wilbur Prizes, 107.

The Price Prize in English, 107.

The Alumni Prizes in Oratory, 108.

Examination Papers, 110.

Catalogue of Students, 123.
- Graduate Students, 123.
- Senior Class, 124.
- Junior Class, 125.
- Sophomore Class, 127.
- Freshman Class, 130.
- Special Students, 133.

Summaries of Students:
- By States, 134.
- By Classes and Courses, 136.

List of Alumni, 137.

Officers of Alumni Association, 205.

REGISTER

OF

THE LEHIGH UNIVERSITY,

SOUTH BETHLEHEM, PA.

1898-1899.

FOUNDED BY ASA PACKER.

BETHLEHEM, PA.:
TIMES PUBLISHING COMPANY.
1899.

TABULAR ALMANAC.

1898.

JULY.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	...
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	...	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

1899.

JANUARY.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

FEBRUARY.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	...	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

JULY.

S	M	T	W	T	F	S
...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	...	...	...	...	...

AUGUST.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

SEPTEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

OCTOBER.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...
...	...	...	...	...	...	...

NOVEMBER.

S	M	T	W	T	F	S
...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	...	...
...	...	...	...	...	...	...

DECEMBER.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	...	...	...	...	...	...

1900.

JANUARY.

S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...
...	...	...	...	...	...	...

FEBRUARY

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	...	...	...
...	...	...	...	...	...	...

MARCH.

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
...	...	...	...	...	...	...

APRIL.

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	...	...	...	...	...
...	...	...	...	...	...	...

MAY.

S	M	T	W	T	F	S
...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...
...	...	...	...	...	...	...

JUNE.

S	M	T	W	T	F	S
...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
...	...	...	...	...	...	...

CALENDAR.

1898.	1898-1899.
Sept. 17, 19, 20, .	Examinations for Admission.
Sept. 21, . . .	First Term begins.
Oct. 13, . . .	Founder's Day.
Nov. 24, . . .	Thanksgiving Day.
Dec. 22, 12½ P.M. .	Christmas Holidays begin.
1899.	
Jan. 3, 8¼ A.M., . .	Christmas Holidays end.
Jan. 14, . . .	Junior Prize Orations due.
Feb. 1, . . .	First Term ends.
Feb. 2, 8¼ A.M., .	Second Term begins.
Feb. 22, . . .	Washington's Birthday.
March 29, 12½ P.M.,	Easter Holidays begin.
April 5, 8¼ A.M., .	Easter Holidays end.
May 20, . . .	University Day Orations due.
May 24, . . .	Senior Examinations begin.
May 30, . . .	Memorial Day (half holiday).
June 5, . . .	Annual Examinations begin.
June 7, . . .	Graduation Theses due.
June 11, . . .	Baccalaureate Sunday.
June 12, . . .	Class Day.
June 13, . . .	Alumni Day.
June 14, . . .	University Day.
June 15—July 8, .	Summer School of Surveying.
June 15, 16, 17, .	Examinations for Admission.

1899.	1899-1900.
Sept. 23, 25, 26, . .	Examinations for Admission.
Sept. 27, . . .	First Term begins.
Oct. 12, . . .	Founder's Day.
Dec. 22, 12½ P.M., .	Christmas Holidays begin.
1900.	
Jan. 3, 8¼ A.M., .	Christmas Holidays end.
Feb. 5, ...	Second Term begins.
June 20, . . .	University Day.

BOARD OF TRUSTEES.

Robert H. Sayre,	South Bethlehem.
William H. Sayre,	South Bethlehem.
Elisha P. Wilbur,	South Bethlehem.
James I. Blakslee,	Mauch Chunk.
Charles Hartshorne,	Philadelphia.
Henry S. Drinker,	Haverford.
Robert P. Linderman,	South Bethlehem.
Henry R. Price, M.D.,	Brooklyn, N. Y.
The Rt. Rev. Ethelbert Talbot, D.D., LL.D.,	South Bethlehem.

(One vacancy.)

HONORARY TRUSTEES.

The Rt. Rev. Leighton Coleman, S.T.D.,	Wilmington, Del.
Charles Brodhead,	Bethlehem.
W. L. Conyngham,	Wilkes-Barre.
The Rev. Marcus A. Tolman,	Mauch Chunk.
The Hon. Henry Green,	Easton.

HONORARY ALUMNI TRUSTEES.

	TERM EXPIRES	
GARRETT B. LINDERMAN, PH.B., Class of 1887,	1899,	South Bethlehem.
W. ARTHUR LATHROP, C.E., Class of 1875,	1900,	Wilkes-Barre.
FRANK HOWE, B.A., E.M., Class of 1878,	1901,	Philadelphia.
THOMAS M. EYNON, M.E., Class of 1881.	1902,	Philadelphia.

OFFICERS OF THE BOARD.

President,
ROBERT H. SAYRE.

Secretary,
ELISHA P. WILBUR.

Treasurer of the University,
ELISHA P. WILBUR.

Assistant Treasurer,
WILLIAM HENRY GUMMERE.

EXECUTIVE COMMITTEE.

ROBERT H. SAYRE, *Chairman.*

ELISHA P. WILBUR, HENRY S. DRINKER,
WILLIAM H. SAYRE, ROBERT P. LINDERMAN,
THE RT. REV. ETHELBERT TALBOT, D.D., LL.D.
R. MORRIS GUMMERE, *Secretary.*

COMMITTEE ON BUILDINGS AND GROUNDS.

ELISHA P. WILBUR, *Chairman*,

ROBERT H. SAYRE, WILLIAM H. SAYRE.

COMMITTEE ON COLLEGE ADMINISTRATION.

HENRY S. DRINKER, *Chairman*,

WILLIAM H. SAYRE, ROBERT P. LINDERMAN.

FACULTY.

THOMAS MESSINGER DROWN, LL.D.,
President of the University.
University Park, South Bethlehem.

WILLIAM H. CHANDLER, PH.D., F.C.S.,
Professor of Chemistry.
251 Cherokee Street, South Bethlehem.

BENJAMIN W. FRAZIER, A.M., SC.D.,
Professor of Mineralogy and Metallurgy.
University Park, South Bethlehem.

H. WILSON HARDING, A.M.,
Emeritus Professor of Physics.

MANSFIELD MERRIMAN, C.E., PH.D.,
Professor of Civil Engineering.
University Park, South Bethlehem.

SEVERIN RINGER, U.J.D.,
Professor of Modern Languages and Literatures, and of History.
424 New Street, South Bethlehem.

EDWARD H. WILLIAMS, JR., B.A., E.M., A.C., F.G.S.A.,
Professor of Mining Engineering and Geology.
Twelfth Avenue, Bethlehem.

JOSEPH F. KLEIN, D.E.,
Professor of Mechanical Engineering.
357 Market Street, Bethlehem.

WILLIAM ANDREW ROBINSON, M.A.,
Professor of the Greek Language and Literature, and Secretary of the Faculty.
St. Luke's Place, South Bethlehem.

EDMUND MORRIS HYDE, M.A., PH.D., L.H.D.,
Professor of the Latin Language and Literature.
Third and Seneca Streets, South Bethlehem.

CHARLES L. THORNBURG, C.E., PH.D.,
Professor of Mathematics and Astronomy.
308 Packer Avenue, South Bethlehem.

WILLIAM C. THAYER, M.A.,
Professor of the English Language and Literature.
59 Market Street, Bethlehem.

WILLIAM SUDDARDS FRANKLIN, M.S.,
Professor of Physics and Electrical Engineering.
518 Seneca Street, South Bethlehem.

LANGDON C. STEWARDSON, B.A.,
Professor of Mental and Moral Philosophy.
138 Church Street, Bethlehem.

JOHN L. STEWART, PH.B.,
Professor of History and Economics.
Ostrum Street, South Bethlehem.

ARTHUR E. MEAKER, C.E.,
Assistant Professor of Mathematics.
542 North Street, Bethlehem.

PRESTON A. LAMBERT, M.A.,
Assistant Professor of Mathematics.
215 South Centre Street, Bethlehem.

JOSEPH W. RICHARDS, M.A., A.C., M.S., PH.D.,
Assistant Professor of Metallurgy, Mineralogy, and Blowpiping.
117 Market Street, Bethlehem.

LECTURERS.

WILLIAM L. ESTES, M.D.,
Lecturer on Physiology and Hygiene.
St. Luke's Hospital, South Bethlehem.

ALEXANDER MACFARLANE, M.A., D.Sc., LL.D.,
Lecturer on Mathematical Physics.
Chatham, Ont.

INSTRUCTORS.

LEWIS BUCKLEY SEMPLE, M.A., Ph.D.,
Instructor in English.
17 North Street, Bethlehem.

RALPH M. WILCOX, Ph.B.,
Instructor in Civil Engineering.
41 Second Avenue, Bethlehem.

FREDERICK W. SPANUTIUS, Ph.B., M.S.,
Instructor in Qualitative Analysis, Assaying, and Industrial Chemistry.
832 Seneca Street, South Bethlehem.

WILLIAM B. SCHOBER, Ph.D.,
Instructor in Organic Chemistry and Chemical Philosophy.
464 New Street, South Bethlehem.

HERMAN EUGENE KIEFER, A.C., M.S., Ph.D.,
Instructor in Geology and Lithology.
438 Cherokee Street, South Bethlehem.

ROBERT CULBERTSON HAYS HECK, M.E.,
Instructor in Mechanical Engineering.
422 Cherokee Street, South Bethlehem.

J. GRANT CRAMER, A.M., Ph.D.,
Instructor in Modern Languages.
Absent on leave.

HARRY M. ULLMANN, A.B., Ph.D.,
Instructor in Quantitative and Industrial Analysis.
148 South Main Street, Bethlehem.

J. HENRY KLINCK, M.E.,
Instructor in Electrical Engineering.
440 Cherokee Street, South Bethlehem.

HENRY STORRS WEBB, M.S.,
Instructor in Electrical Engineering.
411 Cherokee Street, South Bethlehem.

JOHN HUTCHESON OGBURN, C.E.,
Instructor in Mathematics and Astronomy.
462 Chestnut Street, South Bethlehem.

SCHUYLER S. CLARK, S.B.,
Instructor in Physics.
147 South New Street, Bethlehem.

ROBERT B. WILLIAMSON, M.E.,
Instructor in Electrical Engineering.
440 Cherokee Street, South Bethlehem.

NATT M. EMERY, B.A.,
Instructor in English.
American House, Bethlehem.

CHARLES REED MILLER, A.B., PH.D.,
Instructor in Modern Languages.
430 Chestnut Street, South Bethlehem.

WARREN BYRON KEIM, C.E.,
Instructor in Civil Engineering.
468 Chestnut Street, South Bethlehem.

WINTER LINCOLN WILSON, C.E.,
Instructor in Civil Engineering.
Reif's Hotel, Bethlehem.

JOHN BOYT, B.S.,
Instructor in Metallurgy.
431 Cherokee Street, South Bethlehem.

FRANK OLIVER DUFOUR, C.E.,
Instructor in Civil Engineering.
523 Cherokee Street, South Bethlehem.

JOSEPH BARRELL, B.S., E.M.,
Instructor in Geology and Lithology.
Absent on leave.

LUCIEN N. SULLIVAN, B.S.,
Instructor in Mechanical Engineering.
215 Wall Street, Bethlehem.

JOHN C. PECK, PH.B.,
Instructor in Mechanical Engineering.
616 Chestnut Street, South Bethlehem.

THE PACKER MEMORIAL CHURCH.

Chaplain,
THE REV. LANGDON C. STEWARDSON, B.A.
138 Church Street, Bethlehem.

Organist,
J. FRED WOLLE.
148 Church Street, Bethlehem.

GYMNASIUM.

Instructor,
C. W. SMITH.

LIBRARY.

Director,
WILLIAM H. CHANDLER, PH.D.

Cataloguer,
A. W. STERNER.

Shelf Clerk,
PETER F. STAUFFER.

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. Asa Packer, of Mauch Chunk, during the year 1865, appropriated the sum of $500,000, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. On this foundation rose The Lehigh University, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of $1,500,000, and to the University Library one of $500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete education, technical, literary, and scientific, for those professions represented in the development of the peculiar resources of the surrounding region. In furtherance of this purpose instruction is liberally provided in Civil, Mechanical, Mining, and Electrical Engineering, Metallurgy, Chemistry, and in all needful collateral studies. A School of General Literature is also established and thoroughly equipped, and includes the Classical course, the Latin-Scientific course, and the course in Science and Letters.

TUITION.

The following charges are made for tuition:

For students in the Technical courses, $100 for the entire year, or $60 for either term; for students in the school of General Literature, $60 for the entire year, or $40 for either term. A student who has withdrawn more than one

month before the end of either term may make application for the return of a part of the tuition fee; but the amount thus refunded will in no case exceed one half of the last instalment paid to the Treasurer.

These fees include all tuition, with the use of the Library and Gymnasium, but the student is charged for materials and apparatus consumed in the Laboratories.

A limited number of scholarships, covering the cost of tuition, is available for applicants of good moral character who shall pass the entrance examinations creditably, and who for other cause shall be regarded as worthy by the Faculty.

Application for these free scholarships should be made to the President of the University, who will furnish all needed information concerning the regulations which govern their bestowal.

All fees for tuition are payable to the Treasurer of the University in two instalments. The first instalment, of $60, is to be paid to the treasurer of the University on or before October 10; the second, of $40, on or before February 10. For students in the school of General Literature, the instalments are $40 and $20, respectively.

Students who fail to pay tuition fees when due will be notified that their attendance at college exercises must be discontinued until payment is made.

Every candidate for a degree is required to pay a graduation fee of $10, before the degree is conferred.

PUBLIC WORSHIP.

Prayers are held in the Packer Memorial Church of the University every morning, at which attendance is required.

Divine service is held every Sunday morning in the church. Any student who may desire to attend some other place of worship will be permitted to do so upon the request of his parent or guardian or, if he be 21 years of age, upon his own request. The request for such permission should be renewed at the beginning of each year.

Attendance, either at the Packer Memorial Church or at the church of his selection, is required of every student.

SITE.

The situation of the institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

South Bethlehem is situated at the junction of the Lehigh Valley, the New Jersey Central, and the Reading (North Pennsylvania) Railroads, and the University buildings are about a half-mile from the station. New York is eighty-seven and Philadelphia fifty-eight miles distant.

BUILDINGS.

PACKER HALL.

This building, completed in 1869, is four stories in height, 215 feet long, and mostly 60 feet in width. It is built of Potsdam sandstone in the English Gothic style of architecture, and occupies a commanding position, overlooking Bethlehem, West Bethlehem, and South Bethlehem. It contains the lecture and recitation rooms of the departments of Greek, Latin, Modern Languages, History, and Mathematics.

The department of Civil Engineering has, on the first floor, two drawing rooms and three lecture rooms, together with instrument rooms and offices. Here are found collections of bridge models, photographs and blue-prints, specimens of building materials, and also a large number of levels, transits, and other surveying instruments. The testing laboratory in the basement has three machines for tests of tension, compression, flexure, and torsion; a 2000-pound cement machine, and smaller apparatus for special experiments on beams and columns. The cement laboratory has recently been enlarged and its equipment made very complete. The Freshman drawing room of the Civil Engineering department is located on the fourth floor.

The second floor of this building is devoted to the class room and drafting work of the department of Mechanical Engineering. Here are the various recitation rooms, and the well lighted and equipped drafting rooms for the several classes. Near these are the offices of the professor and instructors, the blue-print room, and the reference library of the department, with its large store of prints and working drawings. A wide range of machinery is illustrated by cuts and photographs on the walls. The drafting rooms are further equipped with an extensive assortment of machine parts in cases, with a full-sized link-motion constructed for Lehigh Valley Railroad practice, and with a small eight-wheel locomotive, which is an exact reproduction on a scale of one-sixth of a standard passenger locomotive, and which is noticeable for its exact workmanship and delicate finish.

On the third and fourth floors are to be found the lecture and drawing rooms of the department of Mining Engineering and Geology, the museum of geology and natural history, and other class rooms.

THE CHEMICAL LABORATORY.

This is a thoroughly fire-proof building, built of sandstone, and 219 feet in length by 44 in width.

There are two principal stories and a basement. The upper floor is occupied by the quantitative and the qualitative chemical laboratories, the former accommodating 48 and the latter 84 students. These rooms are 22 feet in height, and are well lighted and ventilated. A laboratory for industrial chemistry and the supply room are also on this floor.

The first floor contains a large lecture room, a recitation room, a chemical museum, and laboratories for organic, physiological, agricultural, and sanitary chemistry.

In the basement is the large laboratory for the furnace assay of ores and a well appointed laboratory for gas

analysis, also rooms containing the apparatus for several processes in industrial chemistry, the engine and air-pump for vacuum filtration, a store room, and the toilet.

A photographic laboratory is located in the third story of the central portion of the building.

THE METALLURGICAL LABORATORY

contains a lecture room, a blowpipe laboratory for class instruction in blowpipe analysis and in the practical determination of crystals and minerals, a museum for mineralogical and metallurgical collections, a mineralogical laboratory provided with a Fuess reflecting goniometer, a polariscope, a Groth's "universal apparat," and a Rosenbusch polarizing microscope, a dry laboratory provided with furnaces for solid fuel and for gas with natural draught and with blast, and a wet laboratory for ordinary analytical work. It is arranged for the instruction of classes in the courses of mineralogy, metallurgy, and blowpipe analysis of the regular curriculum, and to afford facilities to a limited number of advanced students for familiarizing themselves with the methods of measurement and research employed in mineralogy and metallurgy, and for conducting original investigations in these departments of science.

THE PHYSICAL LABORATORY.

This is a stone building, 235 feet long, 44 feet wide, and four stories high. On the first floor are the dynamo laboratory, the workshop, the battery room, and research rooms for thesis work. The dynamo laboratory is provided with a 50 horse-power steam engine and is well equipped with electrical machinery and measuring instruments. In the workshop a 6 horse-power electric motor drives three lathes, a drill-press, an emery grinder, and a buzz-saw; and an 80-cell storage battery is installed in the battery room.

On the second floor are the designing-room, the beginnings of an electro-technical museum, the electrical laboratories, and a department library and reading room.

On the third floor are the physical lecture room, with apparatus rooms adjoining, a large audience hall, and recitation rooms; and on the fourth floor are the laboratories for general physics, light, and photography, and two recitation rooms.

SAUCON HALL.

Extensive alterations to this building were made in 1896, adapting it to the needs of the departments of English and of History and Economics. It is well warmed and lighted, and contains a study and a recitation room for each instructor, a hall for lectures seating 150 persons, a large room on the ground floor which has been fitted up for the use of the Debating Societies, with committee rooms adjoining, and the offices of the Brown and White. A set of rooms on the second floor has been set aside for the use of the Alumni, where they now have a comfortable office, a committee room, and a safe and commodious place for storing their archives. It is proposed to make further improvements in the building in the near future.

THE SAYRE OBSERVATORY.

Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument, and astronomical clock.

THE PACKER MEMORIAL CHURCH

is the munificent gift of Mrs. Mary Packer Cummings, daughter of the Founder of the University. It is one of the largest and most magnificent churches in the State, richly furnished and handsomely appointed in every particular.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall is the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter.

THE GYMNASIUM

is a handsome and spacious structure, built and equipped with the utmost thoroughness. It is furnished with the best patterns of gymnastic apparatus, besides Dr. Sargent's system of developing appliances. It is provided with hot and cold water; tub, sponge, and shower baths, and 389 clothes closets. Opportunities for recreation and amusement are provided in the bowling alleys. It is under the immediate care of a skilled and competent Instructor.

All students are required to undergo a physical examination before being allowed the use of the Gymnasium, and this examination will be repeated once each year during their stay at the University. The proper exercise is prescribed and is required of every student. These regulations are designed to promote the harmonious, symmetrical development of the individual student.

EXPENSES.

Books, materials, paper, pencils, materials used in the laboratories, and drawing instruments are furnished by the student. Materials consumed in the laboratories can be obtained from the University, their value being covered by a deposit made at the opening of that term in which the laboratory work is to be done.

Rooms and board cannot be had in University buildings, but can readily be obtained in many private houses.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included:

Tuition, ...	$100		$100
Board for 36 weeks, . . .	from 126	to	180
Room-rent, with fuel and lights .	40	"	80
Care of room and use of furniture, .	5	"	20
Washing and incidentals, ...	20	"	40
Books, stationery, etc., ...	25	"	50
Total, ...	$316	to	$470

(In the case of students in the School of General Literature, the charge for Tuition is $60, and the totals are $276 to $430.)

ADMISSION OF STUDENTS.

The Register is intended to give all necessary information concerning the admission of students. Application may be made to the Secretary of the Faculty if information is desired which is not given in the Register.

DATE OF EXAMINATIONS.

Examinations for admission to the University will be held in 1899 on Thursday, Friday, and Saturday, June 15, 16, and 17, and on Saturday, Monday, and Tuesday, September 23, 25 and 26. All applicants *must* be in attendance at 8.30 o'clock on the morning of the first day.

The examinations are held in June and September in the following order:

First Day.—English, 8.30 A.M.; Physics, 2 P.M.; Latin and Roman History, 2 P.M.

Second Day.—Geometry, 8.30 A.M.; United States History, 2 P.M.

Third Day.—Algebra, 8.30 A.M.; German or French, 2 P.M.; Greek and Greek History, 2 P.M.

Examinations are also held for admission to the Freshman Class at the beginning of the second term and for admission to the Sophomore Class at the beginning of the first term; information as to these examinations may be obtained from the Secretary of the Faculty. Examinations at other than the appointed times can not be granted without great inconvenience, and candidates so applying will be required to pay a fee of $5 into the Faculty's fund for the aid of indigent students.

CHARACTER OF THE EXAMINATIONS.

The examinations are rigorous and cover the entire ground laid down in the following scheme. They are all conducted in writing, supplemented by an oral examination at the option of the examiner.

Each candidate for admission must be at least sixteen years of age, and must present a testimonial of good moral character from his last instructor, or from the school or institute to which he last belonged, or from some reputable citizen of the community in which he lives.

Candidates for admission to

THE CLASSICAL COURSE

are examined in the following subjects:

1. *English.* — This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing — in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books suggested by the Joint Committee of Colleges and Preparatory Schools for admission to the colleges of the Middle States. These are, for 1899:

Pope's translation of the Iliad, Books I, VI, XXII, XXIV; the Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; De Quincey's Flight of a Tartar Tribe; Dryden's Palamon and Arcite; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables; Cooper's Last

of the Mohicans; Shakespeare's Macbeth; Milton's Paradise Lost, Books I, II; Burke's Speech on Conciliation with America; Carlyle's Essay on Burns.

From one of the last four books in the list a theme will be taken for the composition which forms a part of the examination paper.

The student is also urged to the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

The books suggested for 1900 are as follows .

Dryden's Palamon and Arcite; Pope's translation of the Iliad, Books I, VI, XXII, XXIV; the Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Scott's Ivanhoe; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Tennyson's Princess; Lowell's Vision of Sir Launfal; Shakespeare's Macbeth; Milton's Paradise Lost, Books I, II; Burke's Speech on Conciliation with America; Macaulay's Essays on Milton and Addison.

2. *American History*, with the elements of civic government.

[Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement. Geographical knowledge, to be tested by a reference to an outline map, will form part of this examination.]

3. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle. Maxima and minima of plane figures, and plane and polyhedral angles.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of metrical units.

5. *Latin Grammar.*

6. *Cæsar*, four books of the Gallic war.

7. *Cicero*, six orations, including the four against Catiline.

8. *Vergil*, the first six books of the Æneid, including Prosody.

9. The translation, at sight, of passages from Cæsar and Cicero.

10. The translation of English into Latin. (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

11. *Roman History.*—Creighton, Pennell, or Myers.

12. *Greek Grammar.*

13. *Xenophon*, Anabasis, four books.

14. *Homer*, Iliad, first three books, including Prosody. The Catalogue of Ships may be omitted.

15. The translation, at sight, of a passage from some work of Xenophon.

16. *Greek History.*—Fyffe, Pennell, or Myers.

The pronunciation of Greek according to the written accents is followed in the University, and it is desirable that students preparing to enter be taught this system.

Latin is pronounced according to the method generally known as the Roman Method.

Candidates for admission to the Classical Course who have had, in their preparatory schools, no opportunity of studying Greek, will be admitted to that course in full standing upon presenting an amount of French or German equivalent to two years' work. They will begin Greek in the University and study it throughout the course, and will then receive the degree of B.A.

THE LATIN-SCIENTIFIC COURSE.

Candidates for admission to this course must present the first eleven of the above requirements, but substitute for the Greek sections (numbers 12-16 inclusive) the following:

17. *Solid Geometry.*

18. *German.*—This requirement will be satisfied by the completion of an amount equivalent to Part I of Joynes-Meissner's or Calvin Thomas's Grammar, Buchheim's Reader, and additional reading.

[An equivalent amount in French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with additional reading.]

The candidate is expected to have acquired the ability to understand simple German (or French) prose, by the careful reading of about two hundred duodecimo pages, in addition to the study of Grammar. His proficiency will be tested by questions on the rudiments of grammar, by translations of simple English sentences, and by translations at sight of passages of easy German (or French) prose, containing no rare words.

THE COURSE IN SCIENCE AND LETTERS.

Candidates for admission to this course are examined in all the subjects demanded of those entering the Latin-Scientific Course, except the Latin sections (numbers 5-11 inclusive). They also present the following:

19. *Elementary Physics.*—Especial stress is laid upon the candidate's acquaintance with physical phenomena and with the simpler applications of physical laws. The ability to solve advanced or complicated mathematical problems is not required. The character of the examination is indicated by the set of questions given in this Register under the heading "Entrance Examination Papers."

[Nichols's Outlines of Physics, Gage's Elements of Physics, or Avery's Elements of Natural Philosophy (revised edition).]

In 1900 and thereafter the requirements for admission to the Course in Science and Letters will include Plane Trigonometry and Logarithms, through the solution of right and oblique triangles.

[Wells's New Plane and Spherical Trigonometry and Hussey's five-place Mathematical Tables are used in the University and are recommended for preparation, but their use is not obligatory.]

THE SCHOOL OF TECHNOLOGY.

Candidates for admission to the Courses in Civil Engineering, Mechanical Engineering, Mining Engineering, Electrical Engineering, and Chemistry, are examined in the following subjects:

1. *English.*—This requirement includes: (*a*) English Grammar, especial attention being given to the analysis and correction of sentences; and (*b*) Rhetoric and Composition. Any High School Rhetoric, such as those of Hart, Hill, Williams, Kellogg, and others of a like grade, will be sufficient, together with practical exercises in composition.

Greater stress will be laid, year by year, upon accurate and idiomatic use of the vernacular, upon correct pronunciation, clearness and facility in expression and in the presentation of ideas, an acceptable style in writing—in short, upon all that may fairly be expected of the student as the result of a thorough and intelligent preparation in English. To gain this end, it may be well to use the list of books suggested by the Joint Committee of Colleges and Preparatory Schools for admission to the colleges of the Middle States. These are for 1899:

Pope's translation of the Iliad, Books I, VI, XXII, XXIV; the Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Coleridge's Ancient Mariner; De Quincey's Flight of a Tartar Tribe; Dryden's Palamon and Arcite; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables; Cooper's Last of the Mohicans;

Shakespeare's Macbeth; Milton's Paradise Lost, Books I and II; Burke's Speech on Conciliation with America; Carlyle's Essay on Burns.

From one of the last four books in the list a theme will be taken for the composition which forms a part of the examination paper.

The student is also urged to the fullest possible use of all the opportunities for vocal culture which his means of preparation afford.

Attention is called to the fact that the right is reserved to regard hereafter all examination papers, upon whatever subject, as part of the English examination.

The books suggested for 1900 are as follows:

Dryden's Palamon and Arcite; Pope's translation of the Iliad, Books I, VI, XXII, XXIV; the Sir Roger de Coverly Papers in The Spectator; Goldsmith's Vicar of Wakefield; Scott's Ivanhoe; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Tennyson's Princess; Lowell's Vision of Sir Launfal; Shakespeare's Macbeth; Milton's Paradise Lost, Books I, II; Burke's Speech on Conciliation; Macaulay's Essays on Milton and Addison.

It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any courses except the Classical and the Latin-Scientific.

2. *American History*, with the elements of civic government. [Montgomery's Leading Facts of American History and Fiske's Civil Government may serve to indicate the amount and character of this requirement. Geographical knowledge, to be tested by a reference to an outline map, will form part of this examination.]

3. *Algebra.*—Fundamental principles. Factoring. Least common multiple. Greatest common divisor. Fractions. Involution. Evolution. Radicals. Imaginary quantities. Equations of the first and second degrees. Ratio. Proportion and progressions.

4. *Geometry.*—Fundamental principles. Rectilinear figures. The circle. Proportional lines and similar figures. Comparison and measurement of the surfaces of rectilinear figures. Regular polygons. Measurement of the circle.

Maxima and minima of plane figures, and plane and polyhedral angles. Solid Geometry.

Candidates must have a knowledge of the metric system and be prepared to solve problems in either Algebra or Geometry involving the use of the metrical units.

In 1900 and thereafter the requirements for admission to all Courses in the School of Technology will include Plane Trigonometry and Logarithms, through the solution of right and oblique triangles.

[Wells's New Plane and Spherical Trigonometry and Hussey's five-place Mathematical Tables are used in the University and are recommended for preparation, but their use is not obligatory.]

5. *Elementary Physics.*—Especial stress is laid upon the candidate's acquaintance with physical phenomena and with the simpler applications of physical laws. The ability to solve advanced or complicated mathematical problems is not required. The character of the examination is indicated by the set of questions given in this Register under the heading "Entrance Examination Papers."

[Nichols's Outlines of Physics, Gage's Elements of Physics, or Avery's Elements of Natural Philosophy (revised edition).]

6. *German.* — This requirement will be satisfied by the completion of an amount equivalent to Part I of Joynes-Meissner's or Calvin Thomas's Grammar, Buchheim's Reader, and additional reading.

[An equivalent amount of French will be accepted in cases in which it is inconvenient for the candidate to offer German. The amount thus required in French is equivalent to Whitney's Practical Grammar and Super's Reader, with additional reading.]

The candidate is expected to have acquired the ability to understand simple German (or French) prose, by the careful reading of about two hundred duodecimo pages, in addition to the study of Grammar. His proficiency will be tested by questions on the rudiments of grammar, by translations of simple English sentences, and by translations at sight of passages of easy German (or French) prose, containing no rare words.

Division of Examinations for Admission.

Candidates for admission to the Freshman Class may pass all the examinations in June, or all in September, or partly in June and partly in September, or may take them in *two consecutive years.* In the latter case, for the Technical courses and the course in Science and Letters, candidates may present themselves for examination in the first year in the following subjects: English, History of the United States, and German. No credit will be given unless the candidate has passed satisfactorily in at least two subjects in one year.

The examinations in Algebra, Plane and Solid Geometry, and Physics must be passed in June or September of that year in which the candidate proposes to enter the University.

In the Latin-Scientific and Classical courses candidates may present themselves for examination in the first year in the following subjects: English, History of the United States, Roman History, and Greek History. No credit will be given unless the candidate has passed at least three of the subjects in one year.

The examination in Latin may also be divided, but no credit will be given unless the candidate has passed in at least three of the topics specified at one examination. The examinations in the remaining subjects must be passed in June or September of that year in which the candidate proposes to enter the University.

Candidates intending to enter the University in September are advised to present themselves for examination in June; if they are not fully prepared at that time they will receive credit for the examinations then satisfactorily passed.

CONDITIONAL ADMISSION.

A candidate failing to pass in one or more of the subjects required for admission may, at the discretion of the Faculty, be admitted to his class conditionally, to make up his deficiencies by extra study. When they are made up, he will be received into full standing in his class.

SPECIAL STUDENTS.

Young men of advanced standing, who do not desire to take a full regular course, can enter and select special shorter courses, with the sanction of the Faculty; but in all cases satisfactory examinations must be passed upon the subjects required for entrance to the Freshman Class.

ADMISSION TO ADVANCED STANDING.

Candidates for admission to advanced studies *in any course* are required to pass, *in addition to the entrance examinations for that course*, examinations in the work already done by the classes which they desire to enter. These examinations are held on the same days as those for entrance to the Freshman Class. The additional subjects may be found in the program of studies.

A diploma showing that a degree has been conferred, or a certificate of studies taken at another College will be received, in so far as it covers the subjects required for entrance, in lieu of the *Primary Entrance Examinations only.*

ADMISSION TO GRADUATE COURSES.

Students of this University who have taken their *first* degree, and others, on presenting a diploma of an equivalent degree conferred elsewhere, are admitted to advanced studies, according to the plan to be found in the Register under the general subject of Graduate Students.

PREPARATORY SCHOOL CERTIFICATES.

Certificates are not accepted from any schools in lieu of examinations as evidences of proficiency in Algebra, Geometry, or German, and they will not, as a rule, be accepted in any subject. It is, however, regarded as highly desirable that the examiners should receive from principals of preparatory schools statements with reference to those whom they send up as candidates for entrance, indicating as clearly and fully as possible, in each case, the teacher's opinion of the candidate's character and scholarship and fitness for entering upon collegiate work; and such statements will receive careful consideration, in connection with the results of the entrance examinations.

PROGRAM OF STUDIES.

Showing the number of Exercises per week for each subject and the Text-books Used.

The following is presented as the general program of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject is indicated by the figure in parentheses immediately following.

Two hours of drawing, three of work in the laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

SCHOOL OF GENERAL LITERATURE.

I. In the Classical Course, the program of studies for the first two years consists mainly of required studies, the greater part of the time being given to Greek, Latin, Mathematics, and English. To these are added, during the Freshman Year, courses in Physiology and in Greek and Roman History. In the Sophomore Year, the study of History is continued; a modern language is begun; and thorough courses are given in the elements of Chemistry and Physics. During the Junior and Senior Years the required studies include courses in History, Politics, and Economics; in Psychology and Philosophy; in Astronomy; and in English and French or German. Under the elective system now offered, the student may, if

he chooses, continue throughout his course the study of Greek, Latin, Anglo-Saxon, and kindred subjects; or he may substitute for these, under the guidance and advice of the Faculty, various subjects in theoretical and applied science, as taught to his fellow students in the technical courses. It is believed that the precise and thorough methods which govern the instruction in these subjects increase their value alike for mental equipment and for discipline.

II. Students entering without a knowledge of Greek, may present for entrance either two years' work in German, or one years' work in German and additional work in Mathematics, as stated on pages 22, 23. In the former case, they are admitted to the Classical Course, and begin the study of Greek at once, carrying it on as a required subject throughout the four years. In the latter case, they are admitted to the Latin Scientific Course, in which German and other subjects take the place of Greek.

III. The Course in Science and Letters is offered for those who have had no opportunity of studying either Greek or Latin in preparation for college, the requirements for admission being the same as those prescribed for the technical courses. As in the last-named course, German is substituted for the Greek of the Classical Course, while that of Latin is occupied by an increased amount of work in theoretical and applied science.

It is believed that these courses will be found to be of especial value to those who are fitting themselves for the profession of teaching. Steps have already been taken toward adapting them more closely to this aim, and it is hoped that their usefulness to such students will be still further increased by proposed changes.

Graduates of the Classical Course receive the degree of Bachelor of Arts. Those of the Latin Scientific and Science and Letters Courses receive the degree of Bachelor of Science.

Through the kindness of friends of the University, provision has been made for the awarding of a limited number of free scholarships to students taking the Classical Course who in other respects fulfil the conditions stated on page 13.

DEPARTMENTS OF INSTRUCTION.

GREEK.—The following courses are at present given in this department:

1. Xenophon: Œconomicus or Cyropaedia, with sight readings from Memorabilia or Symposium. Grammar and prose composition. Freshman Classical Required. First Term. (4)

2. Herodotus: selections, with sight readings. Freshman Classical Required. Second Term. (3)

3. Greek History: text-book and lectures. Freshman Classical, Latin Scientific, Science and Letters, Required. Second Term. (2)

4. Lysias: selected orations. Sophomore Classical Required. First Term. (3)

5. Euripides: Bacchae, Iphigenia in Tauris, or Alcestis. Sophomore Classical Required. Second Term. (3)

6. Demosthenes: Olynthiacs and Philippics, or Oration on the Crown. Sophomore Classical Elective. Second Term. (2)

7. Sophocles: Oedipus Tyrannus or Antigone. Junior Classical Elective. First Term. (3)

8a. Aeschylus: Prometheus Vinctus. Junior Classical Elective. Second Term. (3)

8b. Aristophanes: Clouds or Birds. Junior Classical Elective, alternating with 8a. Second Term. (3)

9a. Pindar: selected odes. Senior Classical Elective. First Term. (2)

9b. Homer: Odyssey, twelve books. Senior Classical Elective, alternating with 9a. First Term. (2)

10. Plato: Gorgias, Protagoras, or Phaedo. Senior Classical Elective. Second Term. (2)

A. Beginners' Course (for classical students entering with German and Latin but no Greek). Grammar and Reader. Freshman Required, Both Terms. (4)

B. Second-Year Course (for those who have taken A). Grammar and Reader continued. Xenophon. Homer. Prose composition. Sophomore Required. Both Terms. (3)

Students who have completed A and B will take courses 1, 2, 4, 5, as Required, in Junior and Senior years.

LATIN.—The following courses are given during the present year, of which the first six are required of students in the Classical and Latin-Scientific Courses; No. 3 of those also in the Course in Science and Letters. Nos. 1, 2, and 4 will be completed in Freshman Year, No. 3 begun in the second term of Freshman Year and finished the following term; Nos. 5 and 6 constitute the regular work for Sophomore Year, and No. 9 is the elective work in this department for the second term. Nos. 7 and 8 are optional during Sophomore Year for students in all courses, and the remaining courses are offered as electives during Junior and Senior Years, Nos. 11 and 12 being usually taken together.

1, 2. Cicero: De Senectute, with De Amicitia as accompanying sight reading; Livy: Books XXI and XXII, Book I being read at sight; Horace: Odes and Epodes. Prose Composition, with a careful study of Latin Grammar. Four hours a week throughout the year.

3. Roman History (Liddell's). One hour a week for a year, beginning with the second term.

4. Lectures upon ancient Topography, with a description of Rome and the principal remains in Italy and the provinces, illustrated by a full series of lantern slides. One hour a week during the second term.

5, 6. Horace: Satires, Epistles, and Ars Poetica; Tacitus' Germania, Agricola, and a portion of the Annals; Quintilian, Book X. Three hours a week throughout the year.

7. Roman Private Life, a course of lectures upon the details of this department of antiquities, fully illustrated

by lantern slides, coins, and other means. Two hours a week through the fall term.

8. The Public Antiquities of Rome, also illustrated. One hour a week in the second term.

9. Plautus: Select Plays. Two hours a week, second term.

10. Selected Letters of Cicero and Pliny the Younger. Three hours a week, first term.

11. Persius or Juvenal; Terence, several plays. Two hours a week during the second term.

12. The History of Latin Literature. One hour a week, second term.

13. Lucretius, together with a discussion of the philosophical system of the poem. Two hours a week, first term.

14. Early Latin (Allen's Remnants of Early Latin), with lectures upon the Development of the Latin Language. The last half of the term will be occupied with a course of lectures upon the History of Classical Philology. Two hours a week, second term.

English. — During the first term, Freshman year, Rhetoric is studied, both with the aid of a text-book and through practical exercises, with the design of stimulating invention and imparting the essentials of a clear prose style. It is an advance upon the rhetorical work already done by the student and is made as far as possible a Composition Course. In the second term, a brief history of the language is made the nucleus of work. A general view of American literature is given in weekly lectures, with collateral reading.

The Sophomores spend the first term in a careful study of all that is most typical in English literature; the second, in a critical study of the prose of DeQuincey, Macaulay, and Carlyle, following that with a rapid survey of English prose from the XIV to the XIX century.

The Juniors study models of the best Oratory, both English and American, as a preliminary to the writing

delivery of original orations at some time during the first term; and, during the second, specimens from the works of standard Essayists as models for original essays; with these alternate critical studies of the Elizabethan Drama. Careful training is given in the writing and criticism of essays throughout the course. These will be frequent rather than long; on subjects partly literary and in part technical; and the student will be led to maintain a specific thesis with orderly balance of arguments and arrangement of parts.

Excellence in Oratory is encouraged by the annual contest for the Alumni Prizes, held on the 22d of February, and open to students of the Junior class in all courses.

Instruction in elementary Anglo-Saxon is given regularly for one term to the Juniors in the School of General Literature, to be followed in the next term by a more critical study of the philology and history of the language than would be possible without such an introduction.

Seniors in the same school receive instruction in the Early English of Chaucer and his contemporaries, and in the principles and practice of Versification. They are required to write a short poem, or a critique of some book, of a purely literary cast, selected for their examination and review. The course is completed by a series of lectures on the English poets from Chaucer to Tennyson, and, later, by lectures on special topics in English Literature too important to be passed over with brief mention, yet too comprehensive to be treated earlier in the course. Topics for 1899 will be taken from the following list: On the life and works of Johnson and Goldsmith; of the "Lake School"; of Byron, Shelley and Keats; and of Wordsworth, Browning and Tennyson.

Optional courses will be offered as occasion arises. A Reading Club will be formed, and the student will be encouraged to such private and supplementary reading as his time will permit, and to the formation of a small library of standard books.

MODERN LANGUAGES.—Students in the Classical course are required to study either French or German, beginning with Sophomore year. Those in the Latin-Scientific and Science and Letters courses continue the study of the language presented for entrance with those in the technical courses, and take up the other with the Classical students in the Sophomore year. The courses thus given to the Classical students are as follows:

French.—1, 2. Whitney's Practical French Grammar and Super's Reader. Two hours weekly throughout the year.

3. Grammar, continued. George Sand: La Mare au Diable. Theuriet: Bigarreau. Junior First Term. (2)

4. Taine: Les Origines de la France Contemporaine. Mérimée: Colomba. Short stories by François Coppée and Guy de Maupassant. Dictation. Compositions. Junior Second Term. (2)

5. Readings in Corneille, Racine, Molière, Victor Hugo, Alfred de Musset, and contemporary authors. Compositions. Dictation. Lectures on French Literature. Senior First Term. (2)

6. Readings. Compositions. Lectures in French on modern French authors. Senior Second Term. (2)

7. Conversation class. Optional throughout Senior Year. (1)

German.—1, 2. Brandt's Grammar, Lodeman's Manual of Exercises, and Buchheim's Reader. Two hours weekly throughout the year.

3. Grammar, continued. Beresford-Webb: German Historical Reading Book. Junior First Term. (2)

4. Jageman's Prose Composition. Dictation. Goethe: Hermann und Dorothea. Freytag: Aus dem Staate Friedrichs des Grossen. Junior Second Term. (2)

5. Readings in Lessing, Herder, Goethe, Schiller, etc., and contemporary authors. Compositions. Lectures on German literature. Senior First Term. (2)

6. Readings, continued. Compositions. Lectures in German on modern German authors. Senior Second Term. (2)

7. Conversation class. Optional throughout Senior Year. (1)

HISTORY. — The following courses are given in this department to students in the school of General Literature:

1. Greek History. (Greek 3)

2. Roman History. (Latin 3)

3. General History. Weber's Outlines of Universal History and lectures. Sophomore Second Term, Required. (2)

4. Modern History. Müller's Political History of Recent Times and lectures. Junior First Term, Required. (2)

5. American History (1607–1787). Colonial History, political and economic. Special attention is given to the social and political development of the English Colonies, and the movement toward union and independence. Junior First Term, Required. (1)

6. American History (1787–1885). In this course special emphasis is placed upon the economic, industrial, and financial history of the country from the adoption of the present constitution down to the period immediately following the Civil War. Junior Second Term, Required. (1)

The courses in American History are open to students in the School of Technology as optionals.

ECONOMICS.—The following courses in this department are offered to students in all courses of the University, 1 and 2 being required and 3 and 4 being optional for those who have taken 1 and 2:

1. Elementary Economics. A general course for beginners. Attention given to contemporary American economic problems. Junior Required, First Term. (1)

2. Economic history. Industrial changes in England and in the United States. Junior Required, Second Term. (1)

3. Modern Economics and Social Problems. Senior Elective, First Term. (1)

4. History and Development of Economic Ideas and Systems. Senior Elective, Second Term. (1)

POLITICS.—The following courses are given to students in the school of General Literature:

1. A study of the political organization of the United States, England, Canada, France, and Germany. Comparison of the organization of the typical modern governments. Study of domestic municipal organization. Senior Required. First Term. (2)

2. Study of the principles of politics and government. Relation of politics to economics. Senior Required. Second Term. (2)

MENTAL AND MORAL PHILOSOPHY. — The following courses are given to students in the School of General Literature. No. 5 is required for those in the School of Technology and the others are open to them as optionals.

1, 2. Psychology. Junior Year, Both Terms, Required. (2)

1. A short excursion into Physiological Psychology, with the phenomena of Sensation.

2. The phenomena of Reflection and Will.

3. The History of Modern Philosophy, with especial reference to the Theory of Knowledge, preceded by a brief introductory sketch of Ancient Philosophy. Senior Year, First Term, Required. (2)

4. Ethics. Senior Year, Second Term, Required. (2)

5. The Philosophy of Religion. Senior Year, Second Term, Required. (1)

MATHEMATICS.—While preparation in solid geometry is not at present required for entrance to the Classical course, it will be found of advantage for those who propose to take this course to study that subject, if opportunity offers, at the preparatory school. They will in that case be able to pursue the study of mathematics in the Uni-

versity in the same order as those who are taking technical courses. For those who have not studied solid geometry before entrance, the mathematical work is carried on during the Freshman and Sophomore years as follows:

1. Solid Geometry. Plane Trigonometry begun. Freshman First Term, Required. (4)

2. Plane and Spherical Trigonometry. Mensuration and use of logarithmic tables. Freshman Second Term, Required. (2)

3. Analytical Geometry. Freshman Second Term, Required. (3)

4. Advanced Algebra. Sophomore First Term, Required. (3) Those who present Solid Geometry for entrance will take this course in First Term Freshman.

5. Elementary Mechanics. Calculus begun. Sophomore or Junior First Term, Elective. (5)

6. Differential and Integral Calculus. Analytical Mechanics. Sophomore or Junior Second Term, Elective. (5)

7. Analytical Mechanics, continued. Junior or Senior First Term, Elective. (2)

Astronomy.—Two courses are at present offered in this subject, as follows:

1. Descriptive Astronomy. Junior or Senior, First Term, Elective. (3)

2. Practical Astronomy, with observatory work. Junior or Senior, Second Term, Elective. (2)

Chemistry.—Courses 1 and 2 are required of all students in the literary courses, being given to those in the Science and Letters course in Freshman year, and to those in the other two courses in the Sophomore year. Course 3 is elective in the Classical course and required in the other two. Students who have taken these courses are qualified to take further elective work in the quantitative laboratory as shown in the program of the course in Analytical Chemistry.

1. Lectures on General Inorganic Chemistry. Remsen. First Term. (2)

2. Laboratory work in General Chemistry. First Term. (2)

3. Lectures and laboratory work in Qualitative Analysis. Douglas and Prescott. Second Term. (3)

PHYSICS.—The following courses in General Physics are offered as required in the Science and Letters course and as elective in the other two. Students who have completed these courses may take further elective work in the Physical Laboratory as shown in the program of the course in Electrical Engineering.

1. Mechanics. Lectures and recitations. Second Term. (3)

2. Heat, electricity and magnetism. Lectures and recitations. First Term. (3)

3. Mechanics, heat. Laboratory work. First Term. (1)

4. Electricity and magnetism, light, sound. Lectures and recitations. Second Term. (3)

5. Electricity and magnetism, light, sound. Laboratory work. Second Term. (1)

PHYSIOLOGY AND HYGIENE.—Lectures. Freshman First Term, Required. (1)

MINERALOGY. — The courses in this subject given to students in the School of Technology are offered as electives in the Classical course and as required in the other two. They are

1. Crystallography. Lectures, with practical exercises in the determination of crystals. First Term, two hours weekly.

2. Mineralogy. Descriptive mineralogy, with practical exercises in the determination of minerals. Second Term, three hours weekly.

GEOLOGY.—The courses named below are required in the Science and Letters course and elective in the other two. Opportunity for more advanced study is offered in the courses given to students in Mining Engineering.

1. Lithology. Williams's Lithology, with practical exercises in determining rocks. First Term, three hours weekly.

2. Geology. Lectures and recitations. Le Conte. Second Term, three hours weekly.

DRAWING.—A course in elementary projections and free-hand sketching is required in the Latin-Scientific and Science and Letters courses, Freshman First Term, two hours weekly. More advanced courses, as given to students in the engineering courses, are offered to students in the School of General Literature as electives.

THE CLASSICAL COURSE.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Mathematics,	4	Mathematics,	5
Greek,	4	Greek and Gk. Hist.,	5
Latin,	4	Latin and Rom. Hist.,	5
English,	3	Roman Topography,	1
Physiology,	1	English,	2
	16		18

SOPHOMORE YEAR.

FIRST TERM. *Required.*		SECOND TERM. *Required.*	
Mathematics,	3	Greek,	3
Greek,	3	Latin,	3
Latin and Rom. Hist.,	4	French or German,	2
French or German,	2	English,	2
English,	2	History,	2
Chemistry,	4		12
	18		

Optional.

Roman Antiquities,	2

Elective.
(At least four hours to be chosen.)

Greek,	2
Latin,	2
Roman Antiquities,	1
*Drawing,	4
Physics,	3
Qualitative Analysis,	3

*See C.E., M.E., and E.M. Courses.

JUNIOR YEAR.

FIRST TERM.

Required.

Psychology,	2
Political Economy,	1
American History,	1
Modern History,	2
English,	1
French or German,	2
	9

Elective.
(At least seven hours to be chosen.)

Greek,	3
Latin,	3
Anglo-Saxon,	2
Mathematics,	5
Physics,	3
Physical Lab.,	1
Crystallography,	2
Toxicology,	2
Quantitative Anal.,	5

SECOND TERM.

Required.

Psychology,	2
Political Economy,	1
American History,	1
English,	1
French or German,	2
	7

Elective.
(At least nine hours to be chosen.)

Greek,	3
Latin,	3
English Philology,	2
Bibliography,	2
Mathematics,	5
Physics,	3
Physical Lab.,	1
Mineralogy,	3
Quantitative Anal.,	5

SENIOR YEAR.

FIRST TERM.

Required.

Philosophy,	2
Politics,	2
	4

SECOND TERM.

Required.

Ethics,	2
Politics,	2
Philosophy of Religion,	1
	5

Elective. (At least eleven hours to be chosen.)		*Elective.* (At least ten hours to be chosen.)	
Greek,	2	Greek,	2
Latin,	2	Latin,	2
French or German,	2	French or German,	2
English,	2	English,	2
Political Economy,	1	Political Economy,	1
Pedagogy,	2	Astronomy,	2
Astronomy,	3	Geology,	3
Anal. Mechanics,	2	Blowpipe Analysis,	1
Lithology,	3		

The preparation of a graduating thesis forms a part of the required work of the Senior year in both terms.

In both the Junior and Senior years, technical subjects not named in the above list may be taken as elective studies subject to the advice and approval of the Faculty.

THE LATIN-SCIENTIFIC COURSE.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Mathematics,	4	Mathematics,	5
Latin,	4	Latin and Roman Hist.,	5
German,	3	Greek History,	2
English,	3	German,	3
Freehand Drawing,	2	English,	2
Physiology,	1	Roman Topography,	1
	17		18

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Latin and Roman Hist.,	4	Latin,	3
German,	2	German,	2
French,	2	French,	2
English,	2	English,	2
Chemistry,	4	History,	2
Crystallography,	2	Roman Antiquities,	1
Roman Antiquities,	2	Qualitative Analysis,	3
	—	Mineralogy,	3
	18		—
			18

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Required.		*Required.*	
Psychology,	2	Psychology,	2
Political Economy,	1	Political Economy,	1
American History,	1	American History,	1
Modern History,	2	English,	1
English,	1	French,	2
French,	2		—
	—		7
	9		
Elective.		*Elective.*	
(At least seven hours to be chosen.)		(At least nine hours to be chosen.)	
Latin,	3	Latin,	3
German,	2	German,	2
Anglo-Saxon,	2	English Philology,	2
Mathematics,	5	Bibliography,	2
Toxicology,	2	Mathematics,	5
Quantitative Anal.,	5	Physics,	3
		Quantitative Anal.,	5

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Required.		*Required.*	
Philosophy,	2	Ethics,	2
Politics,	2	Politics,	2
	—	Philosophy of Religion,	1
	4		—
			5

Elective. (At least eleven hours to be chosen.)		*Elective.* (At least ten hours to be chosen.)	
Latin,	2	Latin,	2
French,	2	French,	2
German,	2	German,	2
English,	2	English,	2
Pedagogy,	2	Political Economy,	1
Political Economy,	1	Astronomy,	2
Astronomy,	3	Geology,	3
Anal. Mechanics,	2	Blowpipe Analysis,	1
Lithology,	3		

The preparation of a graduating thesis forms a part of the required work of the Senior year in both terms.

COURSE IN SCIENCE AND LETTERS.

FRESHMAN YEAR.

FIRST TERM.		SECOND TERM.	
Mathematics,	4	Mathematics,	5
Chemistry,	4	Qualitative Analysis,	3
German,	3	Greek and Roman Hist.,	3
English,	3	German,	3
Freehand Drawing,	2	English,	2
Physiology,	1		—
	—		16
	17		

SOPHOMORE YEAR.

FIRST TERM.		SECOND TERM.	
Mathematics,	5	Mathematics,	5
Quantitative Analysis,	5	Physics,	3
Roman History,	1	French,	2
French,	2	German,	2
German,	2	History,	2
English,	2	English,	2
	—		—
	17		16

JUNIOR YEAR.

FIRST TERM.		SECOND TERM.	
Psychology,	2	Psychology,	2
Political Economy,	1	Political Economy,	1
American History,	1	American History,	1
Modern History,	2	French,	2
French,	2	English,	1
English,	1	English Philology,	2
Crystallography,	2	Bibliography,	2
Physics,	4	Mineralogy,	3
Anglo-Saxon,	2	Physics,	4
	17		18

SENIOR YEAR.

FIRST TERM.		SECOND TERM.	
Philosophy,	2	Ethics,	2
Politics,	2	Politics,	2
French,	2	Philosophy of Religion,	1
English,	2	Political Economy,	1
Pedagogy,	2	French,	2
Astronomy,	3	English,	2
Political Economy,	1	Astronomy,	2
Lithology,	3	Geology,	3
	17		15

The preparation of a graduating thesis forms a part of the work of Senior year in both terms.

THE SCHOOL OF TECHNOLOGY.

This school includes six distinct courses :

I. The Course in Civil Engineering.
II. The Course in Mechanical Engineering.
III. The Course in Metallurgy.
IV. The Course in Mining.
V. The Course in Electrical Engineering.
VI. The Course in Chemistry.

These have the same curriculum of studies for the first term of the Freshman year. After the first term the student follows the program of the course which he has selected.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Algebra. (3) Plane trigonometry. (1)

Chemistry.—Lectures. Remsen's Inorganic Chemistry. (2) Laboratory. (2)

German.—Review of Grammar, especially as to syntax. Jageman's Prose Composition. Short stories by different authors. (3) Or *French.*—Review of Grammar, especially as to syntax. George Sand : La Mare au Diable. Theuriet : Bigarreau. Short stories by François Coppée and Guy de Maupassant. (3)

Drawing.—Free-hand sketching. (2)

English.—Rhetoric. (2) Lectures. (1) Essays.

Physiology and Health.—Lectures. (1)

THE COURSE IN CIVIL ENGINEERING.

The special technical studies in this course may be grouped under the heads of Surveying, Applied Mechanics, Road and Railroad Construction, Bridge Design, and Hydraulic and Sanitary Engineering.

The work in Surveying extends over four terms and embraces land surveying, leveling, topography, triangulation, railroad reconnaissance and location, hydrography, and the elements of geodesy. A large equipment of transits, levels, and other surveying tools affords students the opportunity of becoming familiar with the instruments of different manufacturers. Much time is devoted to practice in the field and drafting-room, each student being required to become proficient in the use of instruments, in taking field notes, and in map-drawing. Particular attention is paid to the execution of topographical surveys and maps by the best modern methods. Railroad maps and profiles are made from actual field location. During the Junior year there is done secondary triangulation work of a high order of precision.

The work in Applied Mechanics comprises the strength and elasticity of materials, the theory of the equilibrium of arches, roofs, and bridges, that part of the mechanics of machinery which relates to locomotives and hoisting machines, and the theory of hydraulics and hydraulic motors. Here the theoretical principles are illustrated by examples and problems taken, as far as possible, from actual engineering practice. Tests and experiments on materials are made in the testing laboratory.

The course in Construction familiarizes the student with the qualities of materials used in engineering structures, with methods of preservation and testing, with masonry and foundations, and with the building and maintenance of roads and railroads. All the standard tests for hydraulic cements and mortars are made by each student.

The course in Bridge Design is preceded by the theory of computation of stresses by both analytical and graphic methods. Starting with the specifications for a first-class iron highway or railroad bridge, each student then makes the full computations, strain sheets, designs, working drawings, and bills of material for a plate girder, and a pin-connected truss bridge. The weight of the designed bridge is finally determined and compared with the dead load

assumed for the calculations. The drawings are made and dimensioned in the same manner as in the drafting office of a bridge company. In connection with this course visits of inspection to bridges in the vicinity are regularly made.

The work in Hydraulic and Sanitary Engineering includes the study of systems of water supply, the collection, purification, and distribution of water, the combined and the separate systems of sewerage, the methods for the disposal of sewage, and the best practice for the drainage of houses. There is also a course on the flow of water in pipes and channels, together with the discussion of hydraulic motors.

Besides these special studies there is a course in Astronomy, which includes practical work in the observatory. The study of English, and of French or German, is continued, and opportunity is given for the study of Spanish. Instruction is given during four terms in crystallography, mineralogy, lithology, and geology. During the Junior and Senior years, opportunity is afforded for taking work in architecture.

The student who completes all the studies of this course will receive the degree of Civil Engineer (C.E.).

Opportunities for graduate study are offered by this department in the following subjects: Theory of Elasticity and Strength of Materials, Bridge Engineering, Railroad Engineering, Hydraulic and Sanitary Engineering, Geodesy and the Figure of the Earth.

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Projection Drawing.—Descriptive geometry and isometric drawing. Tracings and drawings of structures. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.* Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Architectural Drawing.—Plans of piers and arches. Problems in stone cutting. Use of water colors. (3)

Construction.—Materials, masonry, and carpentry. Roads, streets, and pavements. Sketches of structures. (3)

English.—English literature. Essays. (2)

SECOND TERM.

Mathematics.—Differential and integral calculus completed. Analytical mechanics. (5)

Land Surveying.—Theory and use of compass, level, and transit. Surveys and maps of farms. Leveling. (4)

Physics.—Electricity and magnetism, light, sound. (3)

Steam Engine.—Holmes's Steam Engine. (3)

English.—English prose literature. Essays. (2)

SUMMER SCHOOL.

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographic maps.

JUNIOR CLASS.

FIRST TERM.

Astronomy.—Descriptive astronomy, with problems. (3)

Strength of Materials.—Elasticity and strength of wood,

stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Construction.—Foundations, arches, walls, dams, and bridges. Visits of inspection. (4)

Geodetic Surveying.—Field work in precise triangulation. Use of solar transit. Lectures on geodesy and the method of least squares. (3)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Economics.—Elementary course. (1)

SECOND TERM.

Railroad Surveying.—Theory of curves. Reconnaissance and location. Survey of a line, with maps and estimates. (4)

Roofs and Bridges.—Computation of stresses in simple trusses. (4)

Graphic Statics.—Analysis of trusses and plate girders. (3)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. (3)

Economics.—Economic problems. (1)

ELECTIVE STUDIES (one to be chosen).

Astronomy.—Practical Astronomy, with observatory work and computations. (2)

Railroads.—Maintenance of way, equipment and operation. Economic location. (2)

Architecture.—Shades, shadows, and perspective. Design for a cottage. (2)

SENIOR CLASS.

FIRST TERM.

Bridges.—Design of plate girders, riveted bridges, and pin-connected trusses, with working drawings. (6)

Hydraulics.—Hydrostatics. Flow of water through orifices, weirs, pipes, and channels. Hydraulic motors. Hydrographic surveying. (4)

Water Supply.—Collection, purification, and distribution of water. Systems of water supply. Irrigation engineering. (3)

Mechanics of Machinery.—Pile drivers, cranes, and elevators. The mechanics of the locomotive. (2)

ELECTIVE STUDIES (one to be chosen).

Geology.—Williams' Lithology, with practical exercises in determining rocks. (2)

Architecture. — History of architecture. Designs for brick and stone houses. (2)

SECOND TERM.

Bridges.—Theory of cantilever, draw, continuous, suspension, and arched structures. Specifications and contracts. (4)

Sewerage.—Systems of sewerage. Disposal and purification of sewage. House drainage. (3)

Electricity.—Equipment and operation of electric railways. Measurement of power. (2)

Philosophy of Religion.—Lectures. (1)

Preparation of Thesis. (4)

ELECTIVE STUDIES (one to be chosen).

Geology.—Historic and dynamic. Le Conte. (3)

Architecture.—Design of trainsheds and tall steel buildings. (3)

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines. The principal subjects taught are: the nature, equivalence, and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, mechanical technology, the principles and practice of machine design, and the measurement of power.

Through the kindness of the officers of the Lehigh Valley Railroad Company and of the officers of the Bethlehem Iron Company, the students of the Lehigh University have access to all the shops of the Railroad from New York to Buffalo and to all the departments and shops of the immense Iron Works, in which the iron and steel industry has

reached its highest development in this country. In this manufacture may be seen every process, from the smelting of the ore to the finishing of great shafts, cranks, and armor plates for the navies of the world, and to the finishing of 16-inch breech-loading rifled guns for the War Department of the United States. These extraordinary privileges are thoroughly appreciated by the Mechanical Engineering Department and are utilized in every part of its work.

The earliest shop visits are for the purpose of acquainting beginners with machine parts and the usual tools of a shop. These visits are a part of the work of a Summer School, lasting four weeks, which is held at the close of the second term of Freshman year. A classified and numbered list of some three hundred and sixty items is given to each student, who makes a written report on them with free-hand sketches containing the leading dimensions. The class is divided into sections, which are separately taken into the shops by the instructor, who then indicates the pieces that are to be examined and gives all necessary explanations. Thus at the very beginning of the course the student is brought into direct contact with the elements of machinery and the common resources of the shop, becomes familiar with technical terms, and is in a position to understand and appreciate subsequent instruction.

In this same Summer School the students of Mechanical Engineering are also given a course in the examination of the mechanical construction of electrical instruments and machinery and in the inspection of their use and operation in electrical plants. This is regarded as a very desirable preliminary to the study of Physics and to the special course in Electrical Engineering which they pursue later on.

That the students may obtain the practical engineering data which they will most need when beginning their work as mechanical engineers they are next required to pursue a course of shop instruction (Mechanical Technology),

which does not necessarily involve manual labor and manipulation of tools, but is principally devoted to familiarizing them with those points in pattern-making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is, therefore, directed to the forms and sizes of machine parts that can be readily constructed in the various workshops; to the time that it takes to perform, and the order of, the various operations; to the dimensions most needed by workmen, and to the various devices for increasing the accuracy of the work, durability of the parts, and convenience of manipulation.

That the students may learn to observe carefully and be trained to think and observe for themselves in these matters, there is required of them a full description of the various processes, operations, and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings, and finished pieces, which are not under construction in the shops at the time and the drawings for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed program given him at the start, but also personally by a teacher, who accompanies him in each shop, gives necessary explanations, and tests the extent and accuracy of his knowledge. Three teachers are engaged in this work, one for each shop and section. Hereafter this study of Mechanical Technology will be carried on in a Summer School lasting four weeks, which will be held at the end of the Sophomore year.

During the course there are frequent visits of inspection to the Bethlehem Iron Company, to the L. V. R. R. shops at Easton, and to other engineering works both in and out of town, with special reference to such subjects as prime movers, machinery for lifting, handling, and transporting, and machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students. These visits are also made

the occasion for continued practice in the free-hand sketching of machinery.

The instruction in Machine Design begins with the second term of the Freshman year and is continued throughout the course. At first tracings and blue prints of good examples of drawings of machinery are made. A thorough drill in projection drawing follows; in this work free-hand sketches are first made, and measurements taken, of machine pieces; these sketches are then converted into full-size working drawings. Then there is considerable practice in the interpretation of such drawings, and general views of lathes, planers, drills, and shapers are made from the drawings of the details. This is followed by difficult projections and intersections and exercises in the empirical proportioning of machine parts. Both empirical and rational formulas are used to determine the dimensions of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers and connecting rods, the data being given as they would arise in practice and the drawings made full size. During the Junior year the class takes up the design of a high-speed steam engine, every dimension being determined by the students and complete drawings made. During the Senior year the students undertake the calculations, estimates, and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. In the case of these machines and of the engine the general plan of arrangement will be given to the students in the form of rough sketches, photographs, or woodcuts. In the last term the students are expected to make original designs for simple machinery, whose object has been fully explained. Throughout the course the work in the drafting-room is carried on as nearly as possible like that of an engineering establishment, and special attention is paid to methods of expediting the work of calculating by means of simple formulas, tables, and diagrams.

The students in Mechanical Engineering are given a special course in Electrical Engineering after they have

finished the regular and general course in Physics. The object is to impart a clear conception of electrical units and a working knowledge of resistance, impedance, inductance, reactance, capacity, and the magnetism of iron, and the magnetic circuit as used in the construction of electrical machinery. Attention is then directed to the theory and calculation of direct current dynamos, to the study of variable and alternating current phenomena, and to the theory of the alternating current transformer. Practical problems are given in these subjects to show their application. The laboratory work which accompanies this special course involves tests of resistance, insulation, consumption of energy, and efficiency. Instruction is also given in locating and remedying the common faults of dynamos and motors.

The course in measurement of power involves much practice with the indicator. Cards are taken from the many types of engines running in the shops and power houses of the vicinity, and thorough drill is given in working up and interpreting these cards. There are also experiments with dynamometers of the friction-brake, belt, float, and cradle varieties. The work in boiler testing usually includes a test of the boilers of the University, a combined engine and boiler test at one of the silk mills, and a test of the boilers and pumping engine of the Water Works. With the engines belonging to the University tests of governor action are made. In addition there are experiments with calorimeters, duty tests of injectors and small pumps, and practice in gas and coal analysis.

After consultation with the head of the department a part, not exceeding one-fourth, of the work peculiar to this course may be replaced by an equivalent amount of work in Electricity.

All the students in this course are required to study both German and French.

The graduates in this course will receive the degree of Mechanical Engineer (M. E.).

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics. — Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (4)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbé Constantin. Daudet: Choix de Contes. Moliére: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SUMMER SCHOOL.

Visits of Inspection.—Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and

sliding pieces, belt and toothed gearing, levers, and connecting rods. (3)

Boilers.—Peabody and Miller. Strength, construction, and wear and tear of boilers. (1)

French.—Whitney's Practical French Grammar. Super's Reader. (2) Or *German.*—Joynes-Meissner's Grammar. Buchheim's Reader. (2)

English.—English literature. Essays. (2)

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. Lectures and recitations. (3) Laboratory. (1)

Steam Engine.—Holmes's Steam Engine. (4)

French.—Grammar and Reader (continued). (2) Or *German.*—Grammar and Reader (continued). Short stories by different modern authors. (2)

English.—English prose literature. Essays. (2)

SUMMER SCHOOL.

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern-making, moulding, forging, fitting, and finishing.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Analytical Mechanics, continued. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Mechanics of Machinery.—Herrmann-Smith. Graphical Statics of Mechanisms. (2)

Electro-technology.—Theory of magnetism. Direct and alternating currents. Dynamos and motors. Electric light and power. (5)

French.—Advanced grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2) Or *German.*—Advanced grammar. Short stories by different modern authors. (2)

Economics.—Elementary economics. (1)

English.—English and American Orators. (1)

SECOND TERM.

Metallurgy. — Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Machine Design.—Calculations and working drawings for a high-speed steam engine. (4)

Machinery of Transmission.—Weisbach-Herrmann. (3)

Dynamo Laboratory. — Testing out. Insulation and conductivity tests. Dynamo and motor tests, and location of faults. (1)

French. — Advanced grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2) Or *German.*—Advanced grammar. Beresford - Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Dictation. (2)

Economics.—Economic problems. (1)

English.—British Essayists. (1)

SENIOR CLASS.

FIRST TERM.

Thermodynamics.—General principles; application to steam engines and air compressors. (3)

Kinematics of Machinery.—Nature and equivalence of mechanisms. Diagrams of the changes of position, speed, and acceleration in mechanisms. Valve and link motions. (5)

Graphical Statics.—Graphical analysis of roof trusses and girders. (2)

Machine Design.—Calculations and working drawings for hoisting, pumping, and metal-working machinery. (4)

Measurement of Power. — Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Mechanics of Machinery.—Weisbach-Herrmann. Hoisting machinery, accumulators, cranes, and locomotives. (2)

SECOND TERM.

Mechanics of Machinery.—Weisbach-Herrmann. Pumps, pumping engines, blowing engines, compressors, and fans. (4)

Machine Design.—Original designs. (5)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Philosophy of Religion.—Lectures. (1)

Preparation of Thesis.

THE COURSES IN MINING ENGINEERING.

These courses aim to fit the student for practical work in either of the branches of mining, metallurgy, metallurgical chemistry, or geology. On account of the great number and scope of the studies necessary to the attainment of the degree of Engineer of Mines (E.M.), which includes that of Metallurgist, five years are required. At the end of the fourth year the student will have completed a course similar to that leading to the scientific degree in other institutions, and will receive the degree of Bachelor of Science (B.S.) in either mining or metallurgy. The following program of subjects and studies shows the requirements for the degree of Engineer of Mines.

Modern Languages.—Although the option of studying French or German lies with the student, it may be well to note that the current literature of the subjects taught in these courses is more abundant in the latter language.

Drawing and Construction.—The course in mechanical drawing begins with tracings of good examples of machine drawings; then follow the interpretation of such drawings, and the making of general views of machines from detailed sketches, exercises in projection drawing

from the same, and the proportioning of simple tools and machines.

A brief course in descriptive geometry is given, in which the student is grounded in the fundamental principles of the subject. The simpler applications are given in the form of problems, and a number of practical examples are worked out in the drawing room.

Under the charge of an instructor, the students make visits of inspection to mines and metallurgical works, during which they examine and make sketches of portions of the plant, and take notes concerning it. From these sketches and notes they subsequently make working drawings accompanied by written memoirs explanatory of the construction and operation of the plant.

In a later portion of the course the students are required to make original designs for mining and metallurgical plant under given conditions, involving exercise in the adaptation and proportioning of structures, machinery, and apparatus to suit the conditions given.

The field work in mining and geological surveying is followed by map construction from field notes.

CHEMISTRY. — The course in theoretical and applied chemistry extends over three years and includes work in wet and dry assaying of all the important ores and metallurgical products met with in actual practice, combined with the working of stoichiometric problems and the study of chemical philosophy. The practical work is that required for a metallurgical chemist or assayer.

With moderate care the expenses in this department need not exceed $120.

MINERALOGY.—This subject is divided into two courses. In the first course, after a short exposition of the laws of crystallography and a description of crystalline forms, practical exercises are held in the determination of simple and complex crystals, in which the student is taught to identify the various crystalline forms observed in minerals by the aid of models and of actual crystals, and with the

use of the application goniometer. The second course includes the subjects of physical, descriptive, and determinative mineralogy. As in the first course, the greater part of the time is devoted to practical exercises, which, in this course, have for their object the determination of minerals. Each student is thus enabled to become familiar with the more common minerals by the actual handling of several hundred specimens, with the facility of making such tests as will not injure them. The presence of one or more instructors during each exercise permits the student to make frequent reports of his determinations, and to receive much instruction as to the characteristics of the minerals. The knowledge thus acquired can be supplemented by visits to the museum.

The course in blowpipe analysis may be considered as auxiliary to the practical exercises in determinative mineralogy. In the latter the student is urged to rely chiefly on physical tests; in the former he is required to determine minerals by the aid of the blowpipe. An elective course in quantitative blowpipe analysis is open to a limited number of students. Those wishing to take this course must have taken the elementary course in blowpipe analysis, or its equivalent, and must obtain permission from the Faculty.

The mineralogical laboratory offers facilities for an advanced course in crystallography and in physical and microscopic mineralogy to a few students who may receive permission to pursue such a course.

GEOLOGY.—This subject is studied with special reference to the needs of the mining engineer. Within a radius of twenty miles the student meets and becomes acquainted with the rocks of the archæan, the palæozoic, and the mesozoic formations, and makes geological maps from his own field notes, paying attention to the lithological characters of the formations, as they are mainly non-fossiliferous south of the Blue Ridge. An extended practical course in lithology familiarizes the student with the rocks of importance to the mining engineer and enables him to determine them by sight. There are over 2,500 specimens in the

collections, embracing nearly all the known species. The course in historic geology is illustrated by a cabinet of typical specimens. The course in economic geology supplements the above work by familiarizing the student with the geological horizon of all the valuable constituents of the earth's crust and the theories of their formation. As Bethlehem is near the center of the "extra morainic" drift, exceptional facilities are afforded for the study of pleistocene geology in Eastern Pennsylvania.

APPLIED MECHANICS.—This embraces hydraulics, a study of the steam engine, and the mechanics of machines employed in mining and metallurgy.

SURVEYING.—A course extending over five terms offers practice in land, mine, and geological surveying, leveling, topography, triangulation, railroad reconnaissance and location, and the use of the solar transit. It also includes practical work in drawing and map construction.

Candidates for the degree of B. S. in Mining will be required to take the course of topographical surveying in the Summer School at the end of the Sophomore year. Candidates for the degree of E. M., who have taken the degree of B. S. in Metallurgy, will be required to take the course of topographical surveying in the Summer School at the end of the Senior year. Students in Metallurgy may fulfill this requirement in anticipation by taking this course in the Summer School at the end of either the Sophomore or the Junior year.

METALLURGY.—There are two courses, making, together, about one hundred and forty lectures on this subject, which extend throughout a year. In these the chief object kept in view is a clear presentation of the principles involved in the various metallurgical processes, looked upon as the application to practice of the laws of chemistry, physics, and mechanics. This is followed, in the case of each process, by a description of the more important examples of the plant and of the methods of conducting the process,

and by indications concerning its economic features. In order to ensure the student's understanding the fundamental principles of metallurgy, and his becoming so familiar with them as to be able readily to apply them, he is required to solve a series of problems in which these principles are involved. Many of the problems are such as are likely to present themselves to the metallurgist in his current practice.

The metallurgical laboratory affords opportunity for special investigations in subjects connected with metallurgy to such advanced students as are competent to conduct them.

MINING.—This subject is covered by three courses. The first begins with the application of economic geology to the needs of the engineer, so that he can study and value mining properties, locate appropriately the necessary plant, and calculate the cost of production. It includes the discussion of faults and the means of finding faulted bodies, with practical problems. The subjects of blasting, timbering, and winning deposits are applied to actual cases, as tunnel-driving, etc., and problems from practical data are solved by the students. The second course covers the subjects of underground and surface haulage; loading, unloading, and stocking ores; pumping; ventilation; hygiene and mining law. A series of problems is given in each of these subjects to cover cases that meet the engineer in ordinary practice. The third course treats of the mechanical preparation of ores by the wet, dry, or magnetic methods, and especially of the preparation of anthracite coal.

The location of the University in the vicinity of the iron works of the Lehigh Valley, and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc and Iron Co. The facilities for the practical study of mining and economic geology are not excelled by those of any other institution in the country. The zinc mines at Friedensville, the paint

ores of the Marcellus formation, and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the semi-bituminous and anthracite coal fields, the block and fossil iron ores of the Clinton measures, the iron mines at Cornwall, Pennsylvania, and the iron and zinc mines of New Jersey; together affording examples of nearly all the methods of winning and dressing valuable deposits. Numerous visits of inspection are made in connection with the work of the course, to familiarize the student with metallurgical and mining processes and afford data for practical examples and projects.

THE COURSE IN METALLURGY.

This course is arranged so that the subjects which prepare the student for practice in the field of metallurgy shall be completed at the end of four years, when the graduate will receive the degree of Bachelor of Science in Metallurgy (B.S.). By remaining a year longer, and taking the subjects laid down for the graduate year, the graduate in the course may obtain the degree of Engineer of Mines (E.M.).

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Drawing. — Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., accompanying the study of descriptive geometry and illustrated from examples of mining and metallurgical plant. (4)

Physics.—Mechanics. (3)

German.—Dictation. Compositions. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbe Constantin. Daudet: Choix de Contes. Moliére: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SUMMER SCHOOL.

Visits of Inspection. — Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Drawing.—Flat tinting with water colors. Graphical problems illustrating the direction and extent of throw in faults. Examination and sketching of metallurgical plant in the vicinity. General views and working drawings of the plant examined, accompanied by written descriptions of its construction and operation. (4)

Land Surveying.—Theory and use of level and transit. Field practice and map-drawing. (2)

English.—English literature. Essays. (2)

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. (3)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Stoichiometry. (2)

English.—English prose literature. Essays. (2)

JUNIOR CLASS.

FIRST TERM.

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Chemistry.—Fresenius's Quantitative Analysis. Laboratory work. (3) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium Dichromate (Cr_2O_3).
3. Copper ore (Cu).
4. Zinc ore (Zn): by both gravimetric and volumetric methods.
5. Lead ore (Pb,S).
6. Silver coin (Au, Ag, Pb, Zn).

Chemical Philosophy.—Tilden. Chemical calculations. Thorpe and Tate. (3)

Assaying.—Including the assay by the dry methods of gold, silver, antimony, lead, iron, and tin ores, coal, and gold and silver bullion. Laboratory work. Ricketts. (3)

Economics.—Elementary economics. (1)

English.—English and American Orators. (1)

SECOND TERM.

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Blow-Pipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Fresenius's Quantitative Analysis. Laboratory work. (3) The following analyses are executed by the student:

7. Copper alloys (Cu, Sn, Zn, Pb).
8. Spiegeleisen (Mn): by both gravimetric and volumetric methods.
9. Iron ore (complete analysis).

10. Limestone (complete analysis).
11. Coal (volatile matter, fixed carbon, ash, H_2O, S, P).

Steam Engine.—Holmes's Steam Engine. (4)

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Economics.—Economic problems. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Blow-Pipe Analysis.—Practice. (1)

Lithology.—Williams's Lithology, with practical exercises in determining rocks. (3)

Chemistry.—Fresenius's Quantitative Analysis. Laboratory work. (4) The following analyses are executed by the student:

12. Slag (complete analysis).
13. Pig iron (complete analysis).
14. Carbon in steel (volumetric).
15. Nickel ore (Ni, Co).
16. Gas analysis.

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Ore Dressing.—Mechanical preparation of ores. Coal washing. Lectures. (3)

Drawing.—Designing of furnaces and other metallurgical plant. (2)

Mechanics of Machinery.—Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Geology.—General geological definitions and principles. Dynamic geology. Dana. Lectures. (2)

Measurement of Power. (1)

Philosophy of Religion.—Lectures. (1)

Preparation of Thesis.

SUMMER SCHOOL.*

Topographic Surveying.—Field work with transit and stadia and with plane table. Topographic maps.

GRADUATE YEAR.

FIRST TERM.

Mining. — Prospecting. Economic geology. Boring. Valuation of property. Timbering and walling. Support of excavations. Tunneling. Systems of mining. Lectures. (4)

Mechanics of Machinery.—Herrmann-Smith. Graphical Statics of Mechanisms. (2)

Drawing.—General views of mining plant and detailed sketches. (5)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (3)

Mine Surveying.—Theory and problems, with maps drawn from actual surveys. (2)

SECOND TERM.

Projects.—In mining. Designing of mining plant. (4)

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Geological Surveying. Theory, practice, and map drawing. (2)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Preparation of Thesis.

THE COURSE IN MINING.

This course is arranged so that the subjects included in the practice of mining and ore dressing will be covered in four years, when the graduate will receive the degree of

*For candidates for the degree of E. M.

Bachelor of Science in Mining (B.S.), and by an additional year of post-graduate work can obtain that of Engineer of Mines (E.M.).

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing.—Tracings and blue prints. Sections of simple construction. Intersections of spheres, cones, cylinders, etc., illustrated from examples of mining and metallurgical plant. (4)

German.—Dictation. Compositions. Beresford - Webb: German Historical Reading Book. Freytag; Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbé Constantin. Daudet: Choix de Contes. Moliére: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Drawing.—Sketches and working drawings of machine pieces. Interpretation of drawings by isometric sketches. General views from given details. Graphical problems illustrating the direction and extent of throw in faults. (2)

Physics.—Heat, electricity, and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Land Surveying.—Theory and use of level and transit. Field practice and map-drawing. (2)

English.—English literature. Essays. (2)

SECOND TERM.

Mathematics. — Differential and integral calculus, completed. Analytical mechanics. (5)

Physics.—Electricity and magnetism, light, sound. (3)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals: E. S. Dana. (3)

Blowpipe Analysis. — Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

English.—English prose literature. Essays. (2)

SUMMER SCHOOL.

Topographic Surveying.—Field work with transit and stadia, and with plane table. Topographic maps.

JUNIOR CLASS.

FIRST TERM.

Mining.—Prospecting. Economic geology. Boring. Valuation of property. Timbering and walling. Support of excavations. Tunneling. Systems of mining. Lectures. (4)

Lithology.—Williams's Lithology, with practical exercises in determining rocks. (3)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Assaying.—Including the assay by the dry methods of gold, silver, antimony, lead, iron, and tin ores, coal, and gold and silver bullion. Laboratory work. Ricketts. (3)

Economics.—Elementary course. (1)

English.—English and American Orators. (1)

SECOND TERM.

Geology.—General geological definitions and principles. Dynamic and historic geology. Lectures. Dana. (4)

Mining.—Underground transportation. Hoisting, drainage, and pumping. Ventilation and lighting. Hygiene of mines. Mining law. Lectures. (4)

Ore Dressing. — Mechanical preparation of ores. Coal washing. (3)

Steam Engine.—Holmes's Steam Engine. (4)

Economics.—Economic problems. (1)

SENIOR CLASS.

FIRST TERM.

Drawing.— General views of mining plant and detailed sketches. (5)

Geodetic Surveying.—Use of solar transit and sextant. Precise triangulation. Elements of geodesy. Determination of the systematic errors of instruments. (3)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels. Hydraulic motors. (3)

Mechanics of Machinery. — Herrmann-Smith. The Graphical Statics of Mechanisms. (2)

Mine Surveying.—Theory and problems, with maps drawn from actual surveys. (2)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

SECOND TERM.

Projects.—In mining. Designing of mining plant. (4)

Railroad Surveying.—Theory of railroad curves. Railroad reconnaissance and location. Survey of a line, with profile, map, and estimate of cost. (4)

Mechanics of Machinery. — Hoisting machinery, accumulators, pumps, pumping-engines, blowing-engines, compressors, and fans. (4)

Geological Surveying.—Theory, practice, map-drawing. (2)

Measurement of Power.—Indicating of steam engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Philosophy of Religion.—Lectures. (1)

Preparation of Thesis.

GRADUATE YEAR.

FIRST TERM.

Chemical Philosophy. — Tilden. Chemical calculations. Thorpe and Tate. (3)

Blowpipe Analysis.—Practice. (1)

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Drawing.—Metallurgical construction. (4)

Chemistry.—Fresenius's Quantitative Analysis. Laboratory work. (5) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium Dichromate (Cr_2O_3).
3. Copper ore (Cu).
4. Zinc ore (Zn): by both gravimetric and volumetric methods.
5. Lead ore (Pb,S).
6. Silver coin (Au, Ag, Pb, Zn).
7. Copper alloys (Cu, Sn, Zn, Pb).
8. Spiegeleisen (Mn): by both gravimetric and volumetric methods.

SECOND TERM.

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Drawing.—Metallurgical design. (2)

Chemistry.—Fresenius's Quantitative Analysis. Laboratory work. (6) The following analyses are executed by the student:

9. Iron ore (complete analysis).
10. Limestone (complete analysis).
11. Coal (volatile matter, fixed carbon, ash, H_2O,S,P).
12. Slag (complete analysis).
13. Pig iron (complete analysis).
14. Carbon in steel (volumetric).
15. Nickel ore (Ni, Co).
16. Gas analysis.

Thesis.

THE COURSE IN ELECTRICAL ENGINEERING.

The object of this course is to provide instruction in the elementary sciences, mathematics, and electrotechnology, supplemented by the study of the strength of materials, the mechanics of machinery, machine design, thermodynamics, and hydraulics.

The elementary course in Mechanics, Heat, Electricity and Magnetism, Light, and Sound begins with the second term of the Freshman year and extends to the end of the Sophomore year. This work is common to all the technical courses.

Students in Electrical Engineering pursue the mathematical theory of electricity and magnetism during the first term of the Junior year and an extended course in the electrical laboratory throughout the Junior year. The electrotechnical work begins with the second term of the Junior year, when the student takes up the technical study of telegraphs and telephones and begins the elementary theory of dynamos and motors and the theory of alternating currents. The Senior year is devoted to electrical designing, the theory of alternating currents, electric lighting, power transmission, dynamo laboratory and heavy electrical testing, electro-metallurgy, and thesis work.

A laboratory fee is charged to students to cover the cost of laboratory supplies. Students taking one laboratory exercise per week are required to pay $3.50 per term: students taking two laboratory exercises per week are required to pay $5.00 per term; and students taking three laboratory exercises per week are required to pay $6.50 per term.

After consultation with the head of the department, a part, not exceeding one-fourth, of the work peculiar to this course may be replaced by an equivalent amount of work in Mechanical Engineering.

The student who completes all the studies of this course will receive the degree of Electrical Engineer (E.E.).

For the benefit of graduates in Electrical Engineering who desire to study the advanced portions of electrical science, instruction is offered in the mathematical theory of electricity and magnetism, in the advanced theory of alternating currents, and in mathematical physics in general.

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics.—Analytical geometry. (3) Plane and spherical trigonometry and mensuration. Use of logarithmic tables. (2)

Physics.—Mechanics. (3)

Drawing and Machine Design.—Tracings and blue prints. Sketches and working drawings of machine pieces. Interpretation of machine drawing by isometric sketches. General views from given details. Sections of stub ends and valve passages. Intersection of boiler flues. Empirical proportioning of machine parts. (4)

German.—Dictation. Compositions. Beresford - Webb : German Historical Reading Book. Freytag : Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.*—Dictation. Compositions. Mérimée : Colomba. Halévy : L'Abbé Constantin. Daudet: Choix de Contes. Molière : L'Avare. Super : Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SUMMER SCHOOL.

Visits of Inspection.—Examination and sketching of machine parts and of electrical apparatus and machinery.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Elementary mechanics. Calculus begun. (5)

Physics. — Heat, electricity, and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

Machine Design.—Proportioning of such machine parts as come under the head of fastenings, bearings, rotating and sliding pieces, belt and toothed gearing, levers, and connecting rods. (3)

Boilers.—Peabody and Miller. Strength, construction, and wear and tear of boilers. (1)

French.—Whitney's Practical Grammar. Super's Reader. (2) Or *German.*—Joynes-Meissner's Advanced Grammar. Buchheim's Reader. (2)

English.—English literature. Essays. (2)

SECOND TERM.

Mathematics.—Differential and integral calculus, completed. Analytical mechanics. (5)

Steam Engine.—Holmes's Steam Engine. (4)

Physics.—Electricity and magnetism, light, and sound. Lectures. (3) Physical laboratory. (1)

French. — Grammar and reader (continued). (2) Or *German.*—Grammar and reader (continued). Short stories by different modern authors. (2)

English.—English prose literature. Essays. (2)

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Analytical Mechanics, continued. (2)

Electricity.—Advanced course in the principles of electricity and magnetism. (4)

Electrical Laboratory. — Course in electrical measurements. (3)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of beams, columns, and shafts. Work in the testing laboratory. (4)

Surveying.—Theory and use of instruments. Land surveying and leveling. Location of electric railways. (2)

French.—Grammar. George Sand: La Mare au Diable. Dumas: Pauline. (2) Or *German.*—Advanced grammar. Short stories by different modern authors. (2)

Economics.—Elementary economics. (1)

SECOND TERM.

Dynamo-electric Machinery.—Direct-current generators and motors. Text-book: Jackson's Electro-Magnetism and the Construction of Dynamos. (3)

Electrical Designing. (1)

Alternating Currents.—The analytical and graphical treatment of alternating currents. (2)

Electrical Laboratory.—Continuation of course in electrical measurements. (2)

Telegraphs and Telephones.—Lectures. (3)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (3)

French.—Advanced Grammar. Short stories by François Coppée and Guy de Maupassant. Vigny: Le Cachet Rouge. Dictation. (2) Or *German.*—Advanced Grammar. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Dictation. (2)

Economics.—Economic problems. (1)

Philosophy of Religion.—Lectures. (1)

SENIOR CLASS.

FIRST TERM.

Dynamo-electric Machinery.—Alternators and transformers. (2)

Electrical Designing.—Lectures. (2)

Alternating Currents. (2)

Electric Lighting and Station Visits. (2)

Dynamo Laboratory. (3)

Measurement of Power.—Indicating of steam engines and dynamometer experiments. (1)

Mechanics of Machinery. — Herrmann-Smith. The Graphical Statics of Mechanisms. (2)

Thermodynamics. (3)

Four lectures on recent advances in Electrical Engineering.

SECOND TERM.

Alternating Currents. (2)

Dynamo-electric Machinery.—Polyphase apparatus. (2)

Electrical Designing. (2)

Dynamo Laboratory. (3)

Electro-metallurgy.—Lectures. (1)

Electric Power and Station Visits. (2)

Hydraulics.—Flow of water through orifices, pipes, and channels. Hydraulic motors. (3)

Preparation of Thesis.

Four lectures on recent advances in Electrical Engineering.

THE COURSE IN CHEMISTRY.

This course of study is designed to prepare students for the profession of the chemist, in connection with metallurgical establishments, sugar refineries, gas works, superphosphate works, electrical machinery manufactories, mining companies, etc., and the general consulting and analytical work of the professional chemist. It is also well adapted to the preparation of teachers of chemistry and as a course preliminary to the study of medicine. It is eminently practical, the student's time being largely occupied by practical work in the large, well equipped and well ventilated chemical laboratories, which were completed in 1885 and constitute the best constructed building for this purpose in this country. The museum of chemistry contains large collections of specimens, for illustrating the lectures on theoretical and applied chemistry.

THEORETICAL CHEMISTRY.—Instruction in this subject begins with lectures twice a week, in the first term of the Freshman year. These lectures are fully illustrated by

experiments, colored diagrams, working drawings and lantern pictures, and specimens from the museum. They include a general introduction to theoretical chemistry, and a description of the non-metallic and metallic elements and their compounds, the general subject of inorganic chemistry. The students are required to take notes of the lectures, and to pass a written examination at the end of the term. There is also a course of experimental chemistry in the laboratory; six hours per week are required.

In the second term of this year stoichiometry and chemical problems and reactions are taught by recitations twice each week.

The study of theoretical chemistry is continued throughout the Sophomore year by recitations three times a week from Tilden's Chemical Philosophy, Thorpe and Tate's Chemical Problems, and Remsen's Advanced Chemistry; in the first term of the Junior year, by a course of lectures and recitations on theoretical organic chemistry, four times a week. These lectures are illustrated by experiments and by specimens from the museum of chemistry.

Written examinations are held at the close of each of the above courses.

Analytical Chemistry.—Qualitative analysis is taught in the second term of the Freshman year, by lectures, recitations, and practical work in the qualitative laboratory, fifteen hours of practical work per week being required. This laboratory is a large, well ventilated, and well lighted room, supplied with convenient working tables, vacuum filtration, hoods for noxious vapors, steam baths, gas and washing appliances, and a commodious room for hydrosulphuric acid. Distilled water is delivered by faucet in this room and the other large laboratories. At the close of the term a practical examination is held in this subject.

After completing this course, quantitative analysis is pursued throughout the Sophomore and the first term of the Junior years. This subject is taught by lectures, reci-

tations, and practical work in the quantitative laboratory, which is equipped like the qualitative laboratory, but is supplied in addition with apparatus for drying precipitates and residues, rooms for the chemical balances, for combustions, and for a reference library.

Fifteen hours per week of laboratory work are required.

The course consists in gravimetric and volumetric analyses, as applied to the substances given in the lists farther on, accuracy being required in the determination of each constituent.

At the close of each term written examinations are held upon the theory and practice of quantitative analysis.

Gas Analysis is taught by lectures and laboratory practice in the gas laboratory. This laboratory is supplied with full and complete apparatus for gas analysis, according to Bunsen's processes, as well as apparatus for some of the more rapid methods. Mixtures of gases are required to be analyzed by the students, within certain limits of error, and a written examination, on the theory and practice, is held at the close of the course.

Assaying.—The assaying of ores by furnace assay, together with gold and silver bullion analysis, by processes practiced in the United States Mint, is taught by lectures and practical work in the first term of the Senior year, nine hours of practical work per week being required. The course includes the assaying of ores of lead, tin, antimony, gold, silver, and iron, coal, and gold and silver bullion.

The assaying laboratory is supplied with large working tables, twenty-nine crucible and two iron furnaces, and eight muffle furnaces, with adjoining rooms for balances, and gold and silver bullion analysis.

A certain accuracy of results and a written examination as regards theory and practice are required.

Organic Chemistry.—The practical work in this subject is performed in the second term of the Junior year, eighteen

hours per week being required, with conferences and recitations each week. The laboratory for this work is equipped similarly to the quantitative laboratory, in addition being supplied with steam, cold water and air blast upon the working tables, and a full supply of apparatus for the various determinations and experiments, including combustion furnaces, furnaces for heating sealed tubes, mercury pump, Hoffman's, Dumas' and Meyer's apparatus for vapor densities, nitrometers, chemical balances, etc.

The course consists of determinations of specific gravities, melting points, boiling points, vapor densities; chlorine, bromine, iodine, and sulphur of organic substances.

Combustion analysis, nitrogen determination, fractional distillation, and the preparation of fifty pure organic compounds and a number of analyses are included.

Industrial Chemistry.—A course of lectures is delivered upon this subject in the second term of the Senior year, illustrated by experiments, diagrams, lantern pictures, and specimens from the museum of chemistry. The working laboratories for this subject contain an apparatus for making illuminating gas, an alcohol still, worm and doubler, and a complete working model of a sugar refinery, including filters, vacuum pan, and centrifugal. There is also apparatus for use in the manufacture of chemicals, for dyeing, calico printing, and bleaching. In connection with these laboratories is a room containing a photometer and apparatus for determining the sulphur, ammonia, and specific gravity of illuminating gas; also a laboratory for the testing of alcoholic liquors, sugar, molasses, bone black, soap, petroleum, paints, dyes, superphosphates, tallow, illuminating and lubricating oils, rubber, explosives, paints, asphalts, and other commercial products, with the necessary technical apparatus. The students make practical experiments in this direction, and, with an instructor, visit various industrial establishments in this neighborhood and in and around New York City. Fifteen hours of laboratory work are required each week throughout the Senior year.

TOXICOLOGY.—A course of lectures on this subject is given in the first term of the Junior year, illustrated by experiments and by the large collection of specimens of poisons from the museum of chemistry. This is supplemented by a short course of laboratory work on some of the common poisons.

SANITARY CHEMISTRY.—During the second term of the Senior year attention is given to the qualitative and quantitative examination of air, water, food, disinfectants, baking-powders, flour, bread, tea, coffee, cocoa, spices, milk, butter, lard, beer, and other subjects connected with this branch of the science. Special apparatus is provided for this work, as recommended by the best authorities on the subject.

PHOTOGRAPHIC CHEMISTRY.—A well equipped photographic laboratory and dark rooms are provided, in which the students of the chemical course receive practical instruction.

PHYSIOLOGICAL CHEMISTRY.—The examination of urine, blood, organic and inorganic poisons, etc., receives a proper amount of attention.

The course also includes instruction in physics, mineralogy, blowpipe analysis, metallurgy, and geology, which are of great value to the chemist.

MICROSCOPY.—Instruction in the use of the microscope is given in the first term of the Senior year, six hours of laboratory work each week being required.

In the Senior year the student is required to prepare a thesis on some subject, selected by the Professor of Chemistry, involving practical work in the laboratory in addition to the literary labor, each graduate thus making a contribution to the progress of the science, as a preliminary to the reception of his degree.

The graduate of this course receives the degree of Analytical Chemist (A.C.).

Students, not candidates for a degree, are admitted to special courses in chemistry, of which they will receive certificates.

The laboratories are under the immediate charge of the Professor and Instructors of Chemistry and are open to the students from 8 o'clock A.M. to 6 o'clock P.M., including Saturdays. Students are at liberty to work in the laboratories beyond the required hours as their time may permit. Students are charged for materials and apparatus consumed; with moderate care this expense need not exceed $50 per year.

FRESHMAN CLASS.

FIRST TERM.

See page 46.

SECOND TERM.

Mathematics. — Plane trigonometry. Use of logarithmic tables. (1)

Chemistry.—Lectures and laboratory practice. Douglas and Prescott's Qualitative Analysis. (5)

Physics.—Mechanics. Lectures and recitations. (3) Laboratory. (1)

Stoichiometry. (2)

German. — Dictation. Composition. Beresford-Webb: German Historical Reading Book. Freytag: Aus dem Staate Friedrichs des Grossen. Readings from Lessing, Schiller, Goethe. (3) Or *French.* — Dictation. Compositions. Mérimée: Colomba. Halévy: L'Abbé Constantin. Daudet: Choix de Contes. Molière: L'Avare. Super: Readings from French History. Readings from Victor Hugo, Balzac, Dumas. (3) Conversation class in both languages optional throughout the year.

English.—History of the English language. Essays. (2)

SOPHOMORE CLASS.

FIRST TERM.

Chemical Philosophy.— Tilden. Chemical problems. Thorpe and Tate. (3)

Quantitative Analysis.—Fresenius's Quantitative Analysis. (5) The following analyses are executed by the student:

1. Iron wire (Fe).
2. Potassium Dichromate (Cr_2O_3).
3. Barium chloride (Ba, Cl, H_2O).
4. Magnesium sulphate (MgO, SO_3, H_2O).
5. Disodium hydrogen phosphate (P_2O_5).
6. Rochelle salt (K_2O, Na_2O).
7. Volumetric determination of chlorine.
8. Acidimetry (HCl, H_2SO_4, HNO_3, $HC_2H_3O_2$).
9. Alkalimetry (KOH, NaOH, NH_4OH, soda ash, pearl ash).
10. Chlorimetry (bleaching powders).
11. Copper ore (Cu).
12. Zinc ore (Zn): by both gravimetric and volumetric methods.

Quantitative Analysis.—Conference. (1)

Physics.—Heat, electricity and magnetism. Lectures and recitations. (3) Mechanics, heat. Laboratory. (1)

English.—English literature. Essays. (2)

SECOND TERM.

Physics.—Electricity and magnetism, light, sound. Lectures and recitations. (3) Laboratory. (1)

Quantitative Analysis.—Fresenius's Quantitative Analysis. (6) The following analyses are executed by the student:

13. Lead ore (Pb, S).
14. Silver coin (Au, Pb, Ag, Cu).
15. Spiegeleisen (Mn): by both gravimetric and volumetric methods.
16. Copper alloys (complete analysis).
17. Ilmenite (TiO_2).
18. Iron ore (complete analysis).
19. Limestone (complete analysis).
20. Coal (volatile matter, fixed carbon, ash, H_2 O, S, P).
21. Slag (complete analysis).

Quantitative Analysis.—Conference. (1)

Chemistry.—Remsen. Advanced course. (3)

English.—English prose literature. Essays. (2)

JUNIOR CLASS.

FIRST TERM.

Toxicology.—Lectures. (2)

Quantitative Analysis.—Fresenius's Quantitative Analysis. (5) The following analyses are executed by the student:

22. Guano (NH_3, P_2O_5, H_2O).
23. Clay (complete analysis).
24. Manganese ore (MnO_2).
25. Mineral water (complete analysis).
26. Pig iron (complete analysis).
27. Nickel ore (Ni, Co).
28. Carbon in steel (colorimetric).
29. Gas analysis.

Quantitative Analysis.—Conference. (1)

Organic Chemistry.—Lectures and recitations. (4)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Economics.—Elementary economics. (1)

English.—English and American Orators. (1)

SECOND TERM.

Organic Chemistry.—Laboratory. (6)

Organic Chemistry.—Conference. (1)

Metallurgy.—Metallurgical processes. Furnaces. Refractory building materials. Combustion. Natural and artificial fuels. Metallurgy of iron. (5)

Mineralogy.—Descriptive mineralogy, with practical exercises in the determination of minerals. E. S. Dana. (3)

Blowpipe Analysis.—Lectures, with practice. Plattner, Brush, or Nason and Chandler. (1)

Economics.—Economic Problems. (1)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of copper, lead, silver, gold, etc. (4)

Assaying.—Including the assay by the dry method of gold, silver, antimony, lead, iron, and tin ores, coal, gold and silver bullion, and rich lead. Ricketts. (3)

Industrial Chemistry.—Laboratory. (3)

Geology.—Williams's Lithology, with practical exercises in determining rocks. (3)

Microscopy.—Laboratory. (2).

Blowpipe Analysis.—Practice. (1)

Preparation of Thesis.

SECOND TERM.

Industrial Chemistry.—Lectures. (3)

Industrial Analysis.—Laboratory. (3)

Industrial Analysis.—Conference. (1)

Agricultural Chemistry.—Laboratory. (1)

Sanitary Chemistry.—Laboratory. (1)

Geology.—Historic and dynamic geology. Lectures. LeConte. (3)

Philosophy of Religion.—Lectures. (1)

Preparation of Thesis. (4)

PHYSICAL CULTURE.

The Gymnasium is open morning, afternoon, and evening; in all, 45 hours a week. Exercise in it is required of all students who are fitted to take it. Class drill with the Instructor and individual exercise are prescribed.

GRADUATING THESES.

Every student is required to present a thesis upon some topic connected with the course from which he is to graduate, as a necessary portion of the exercises for his final examination for a diploma. These theses are accompanied by drawings and diagrams, whenever the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the Secretary of the Board of Trustees and by the Faculty of the University. For all the partial courses a certificate is given, signed by the Secretary of the Faculty, and showing what the student has accomplished.

GRADUATE STUDENTS.

Graduate students wishing to remain a year or more and pursue a course of study as candidates for another Degree may do so with the sanction of the Faculty. Those wishing to take *special* courses of study will be afforded every facility for so doing.

GRADUATE DEGREES.

M. A.

The Faculty will recommend for the Degree of Master of Arts any candidate, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue, for at least one year at this University, or two years elsewhere, a course of liberal study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same, and present a satisfactory Thesis.

M. S.

The Faculty will recommend for the Degree of Master of Science any candidate, otherwise properly qualified, who, after taking at this University any Degree in the School of Technology, shall pursue, for at least one year at this University, a course of study prescribed by the Faculty in at least two departments (under at least two professors), pass a thorough examination in the same and present a satisfactory Thesis. Graduates of the Latin-Scientific Course, or of that of Science and Letters, are per-

mitted to study *in absentia* for the degree of M.S., subject to the same restrictions as those prescribed for candidates for the degree of M.A.

The Theses presented by candidates for Graduate Degrees are retained by the University.

Applicants for either of these degrees will be required to complete the prescribed work within the allotted time. Special action of the Faculty is required for any extension of time.

THE UNIVERSITY LIBRARY.

The Library building was erected by the Founder of the University in 1877, at a cost of $100,000, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than $20,000 were contributed by her family and friends as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of $500,000 has been given for the permanent endowment of the library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the center is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for one hundred and sixty thousand volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Ninety-seven thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about two hundred and fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

I. The Library is open every day, except Sundays and Legal Holidays, from 8 A.M. until 10 P.M., and on Sundays for the students and others connected with the University from 1:30 P.M. until 9:30 P.M.

II. Admission is free to all persons over 16 years of age.

III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.

IV. The University Professors and Instructors, only, are allowed to take books from the Library Building.

V. No person is allowed to enter the alcoves, or remove any book from the shelves, without permission of the Director.

VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.

VII. In taking notes, pencils, and not pen and ink, are to be used.

VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.

IX. Any person not conforming to these Regulations will be denied the privilege of the Library.

X. Any person who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

THE ECKLEY B. COXE MEMORIAL LIBRARY.

In memory of the Honorable Eckley B. Coxe, who was for many years a Trustee of the University and who was profoundly interested in its welfare, Mrs. Coxe has pre-

sented to the University his technical library, consisting of 7727 volumes, together with 3429 pamphlets. As the working library of a man who was remarkable as well for the breadth of his culture as for the extent and thoroughness of his acquaintance with the whole field of applied science, this addition to the resources of the University possesses the greatest value for all professional students.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an astronomical observatory was erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an equatorial telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior sidereal clock, by Wm. Bond & Sons; a zenith telescope, by Blunt, and a field transit, by Stackpole. There is also a prismatic sextant, by Pistor & Martins.

Students in practical astronomy receive instruction in the use of the instruments and in actual observation.

The land upon which the Observatory stands, consisting of seven acres adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

THE UNIVERSITY MUSEUM.

In addition to the large collection illustrating all branches of Industrial Chemistry, the Museum includes collections in Metallurgy, Geology, Zoölogy, and Archæology.

The Metallurgical Cabinet already includes specimens illustrating the various processes for obtaining the more common metals.

The Zoölogical Cabinet includes the Werner collection of nearly all the types of American birds with their nests and eggs, and the Packer collection of recent shells.

The Geological Cabinet numbers over ten thousand specimens and includes the Palæontological, Mineralogical,

Petrographic, and Economic collections. The first contains good specimens of nearly all the common genera. The Mineralogical division includes the Keim and Roepper collections—the latter being especially complete and valuable from a crystallographic standpoint. The Petrographic division numbers several thousand specimens and, besides including numerous varieties of nearly all the rocks of the globe, contains a duplicate set from the collection of the Second Geological Survey of this State. The Economic division was formed and given by Dr. James P. Kimball, ex-Director of the Mint, and formerly Professor of Economic Geology.

The Cummings Archæological Cabinet numbers three thousand specimens and includes Dr. Stubbs's collection of Indian relics, weapons, and utensils.

SUMMER SCHOOL OF SURVEYING.

The regular course in topographic surveying for students in civil and mining engineering is given in the summer vacation between the Sophomore and Junior years. An optional course in Land Surveying is also offered at the same time, for which a fee of $15 is charged. These courses are open to a limited number of persons, not students at the University, who are qualified to pursue them, upon payment of the same fee. Application should be made to the professor of civil engineering before June 1st.

UNIVERSITY LECTURES.

From time to time during the University year, distinguished members of the various professions are invited to lecture before the student body upon those special subjects to which they have given particular attention and upon which they are authorities.

The following lectures were given in this course before the beginning of the present academic year:

Mr. Eckley B. Coxe, "Technical Education."

Dr. R. W. Raymond, "The Nature and Force of the Mineral Land Patents of the United States."

Mr. R. W. Davenport, "The Manufacture of Armor Plate."

Mr. E. D. Leavitt, "A Modern Mining Plant."

Professor W. T. Sedgwick, "Germs as Friends and Foes."

Dr. C. B. Dudley, "Lubrication."

Mr. C. E. Webster, "Inspection of Railroads."

Professor Charles McMillan, "The Purification of Sewage by Filtration through Coal Ashes."

Mr. H. F. J. Porter, "Modern Methods of Making Steel Forgings."

Col. H. G. Prout, "Railroad Accidents."

Mr. John Birkinbine, "Engineering on the Great Lakes."

Mr. W. B. Snow, "Mechanical Draft."

Mr. H. W. Raymond, "Warships Old and New."

Mr. Alfred Raymond, "Chartres Cathedral."

THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of botanical and zoölogical specimens belonging to the Society are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

THE ENGINEERING SOCIETY.

This Society was organized in 1873, and admits, by election, students in the Junior and Senior Classes. Its meetings are held fortnightly. At these, papers relating to engineering subjects are read and discussed. From 1885 to

1890 it issued quarterly five volumes of "The Journal of the Engineering Society," containing contributions by the members, alumni, and others. Many of the papers read before this society from 1890 to 1893 were published in "The Lehigh Quarterly."

The society includes in its membership students from all the engineering courses of the University. In addition to the general organization of the society, with fortnightly meetings as above stated, the representatives of the Civil and Mechanical Engineering courses form subordinate sections, with separate organizations and stated meetings, for the discussion of subjects of particular interest.

THE ELECTRICAL ENGINEERING SOCIETY

was organized in November, 1887. Its object is to supplement the regular work of the department by the study and discussion of electrical subjects.

THE AGORA AND THE FORUM

are literary and debating societies which meet semi-monthly. The Agora is the older society and was formerly restricted in its membership to students in the School of General Literature, but in 1893 it was thrown open to all students; and shortly afterward the Forum was organized. These societies have proved of great advantage to their members in the development of concise and logical thinking, in the promotion of ease before an audience, and in the acquirement of experience in parliamentary methods. Through these societies the University is represented in the Pennsylvania Inter-collegiate Oratorical Union. An annual contest in debate is held with representatives of the literary societies of Lafayette College. The societies have justified their existence by the great increase in the amount of attention given, not only to training in oratory and debate, but also to those subjects of the day which are constantly discussed at their meetings.

THE MATHEMATICAL CLUB.

This club was organized in February, 1895. Its members are students in the Junior and Senior classes. Its object is to continue the study of higher mathematics after having completed the mathematical course of the University. It holds frequent meetings at which papers are read and discussed by its members.

THE LEHIGH UNIVERSITY CHRISTIAN ASSOCIATION.

This is a voluntary organization of the students for the promotion of the religious, moral, and social life of the University. It was organized April 18, 1890, and on Oct. 11, 1890, united itself with the Intercollegiate Young Men's Christian Association. The movement is distinctly for and by students, all the officers being chosen from the student-body. Those connected with Evangelical churches of whatever creed are eligible to *active membership; associate membership* may be claimed by men of good moral standing who are not members of churches. The association is continually growing, and is extending a marked influence for good among the men.

FOUNDER'S DAY.

On the second Thursday of October of each year, Commemorative Exercises are held in honor of the Founder of the University. On Thursday, October 13, 1898, the nineteenth Founder's Day was celebrated. An address was delivered by Professor Langdon C. Stewardson, Chaplain of the University. His subject was "Origins and Destiny."

UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rt. Rev. Ethelbert Talbot, D.D., LL.D., Bishop of Central Pennsylvania, was the preacher on Sunday, June 12, 1898, in the Packer Memorial Church.

THESES.

Theses on the following subjects were prepared by candidates for degrees in 1898:

FOR THE DEGREE OF MASTER OF SCIENCE.

BARRY MAC NUTT, E.E., Bethlehem.
A Study of Galvanic Polarization.

HENRY STORRS WEBB, B.S. (M.I.T.), South Bethlehem.
Hysteresis Loss in Soft Iron for Small Ranges of Induction.

FOR THE DEGREE OF ENGINEER OF MINES.

JOHN BOYT, B.S., Adamsford.
Haulage by Compressed Air, with a View of the High Pressure System at Alaska Colliery.

THOMAS CEDWYN THOMAS, B.S., Wilkes-Barre.
The Efficiency of Grates for Burning Small Sizes of Anthracite Coal.

FOR THE DEGREE OF BACHELOR OF ARTS.

ALANSON QUIGLEY BAILEY, Paterson, N.J.
Socrates, as Portrayed by Xenophon and Plato.

JACOB B. KRAUSE, South Bethlehem.
The Roman Senate.

MARTIN SHAAFF STOCKETT, Pottsville.
The Kansas-Nebraska Struggle.

CHARLES EDWARD WEBSTER, JR., South Bethlehem.
The Place of Euripides in the History of the Dramatic Art.

FOR THE DEGREE OF CIVIL ENGINEER.

HARRY LEIGH ADAMS, Washington, D. C.
Investigation of the Water Supply System of Bethlehem, Pa.

ALEJANDRO BARRIENTOS, Santiago de Cuba, Cuba.
Design for a Stone Arch Bridge of 60 feet Span.

WILLIAM ADAM DEHM, New Britain, Conn.
The Alignment and Grade of the Lehigh & Lackawanna Railroad between Bethlehem and Bath, Pa.

CHARLES MEIRS DENISE, B.S. (Rutgers), Allentown, N.J.
Investigation of the Sewerage System of Plainfield, N.J.

EDGAR RAYMOND FRISBY, Washington, D.C.
The Economic Depth and Limiting Span of the Pratt Truss.

FRANCISCO MARTINEZ GALLARDO, M.E., Guadalajara, Mex.
The Power and Efficiency of the Pumping Machinery of the Water Works at Bethlehem, Pa.

FRANK HAMMOND GUNSOLUS, Tipton, Iowa.
The Four-Point Problem in Geodetic Triangulation.

FRANK NORMAN KNEAS, Norristown.
Design for a Lattice Bridge and Approaches at Norristown, Pa.

JOHN BROWN LINDSEY, JR., Frankfort, Ky.
The Stresses in Gun Tubes and Hoops.

CLARENCE ALBERT LOOMIS, Plainfield, N. J.
Review of the Water Supply System of Plainfield, N. J.

JOSÉ ARISTIDES DE OBALDIA, Panama, Colombia.
Review of Water Powers on the Lehigh Canal and Monocacy Creek near Bethlehem, Pa.

HOWARD CHARLES PADDOCK, East Berlin, Conn.
Design for a Railroad Train-shed with Three-hinged Arches.

FREDERICK ALLEN PERLEY, Williamsport.
The Backwater Problem on the Proposed Nicaragua Canal.

VICTOR CLINTON RECORDS, Laurel, Del.
Plan and Estimate for a Water Supply for Smyrna, Del.

PERCY LAWRENCE REED, New Bedford, Mass.
Review of the Trestles and Culverts on the Lehigh & Lackawanna R. R. between Bethlehem and Bath, Pa.

DANIEL FRANKLIN B. SHEPP, Tamaqua.
The Sanitary Condition of the U. S. Military Camps at Falls Church, Va., Dunn Loring, Va., and Middletown, Pa.

LAWRENCE WOODEN, Hampstead, Md.
Plan and Estimate for the Water Supply of Reisterstown, Md.

HARRY STATTEN ZIMMERMAN, State Line.
The Stresses in Beams and Bridges Due to the Velocity of the Live Load.

FOR THE DEGREE OF MECHANICAL ENGINEER.

JUNIUS BALLARD, Louisburg, N. C.
When is it Economical for a Railroad to Buy Locomotive Parts?

HENRY DAVID BISHOP, Bethlehem.
The Progress in the Economical Production of Superheated Steam.

HORATIO FRANCIS BROWN, Baltimore, Md.
Modern Railway-signal Practice.

GEORGE DAVIES, Catasauqua.
Design for an Electric Traveling Crane.

JOHN JACOB ECKFELDT, Conshohocken.
Discussion of the Diesel Motor.

LINDEN ERLE EDGAR, Wilkes-Barre.
Investigation of Car Haulage about Anthracite Coal Mines.

WILLARD BOYER FULLER, Catasauqua.
Design for a Car Wheel Plant.

WENTWORTH GREENE HARE, Philadelphia.
Experiments in Gas Engine Running.

EDWARD DARLING HILLMAN, Wilkes-Barre.
An Underground System for Rapidly Delivering Mail, Parcels, etc., in New York City.

BASIL GEORGE KODJBANOFF, Monastir, Macedonia.
Mechanical Contrivances Used in the Construction of East River Tunnel.

LEE HOLMES MARSHALL, Pittsburg.
The Erection of an Electric Elevator for Passenger Service.

CARROLL WINSTON QUARRIER, Charleston, W. Va.
The Experimental Determination of the Moments of Inertia of the Straight Line Engine.

BENJAMIN DEWITT RIEGEL, Riegelsville, N.J.
The Comparative Efficiency of Small Coal Determined by Special Tests.

D'ARCY WENTWORTH ROPER, Petersburg, Va.
The Design of an Electric Elevator for the Warehouse of Roper & Co., Petersburg, Va.

LEWIS CHESTON STARKEY, Bustleton.
The Temperature-Entropy-Curve and its Application to Engineering.

E. HARRISON SYMINGTON, Baltimore, Md.
Discussion of Jet Air Turbine Applied to Portable Differential Drill.

EDWARD HILEMAN WARING, Plainfield, N.J.
Determination of Power Needed to Drive a Vessel at a Given Speed.

CHARLES BARTLETT WARREN, Westfield, Mass.
A Comparison of Belt and Electric Transmission in a Textile Mill.

THEODORE BENJAMIN WOOD, Chambersburg.
Design of a Pulley Moulding Machine.

WARREN WORTHINGTON, Rushland.
Are High Speed Pumps Feasible?

FOR THE DEGREE OF BACHELOR OF SCIENCE

(IN METALLURGY).

HENRY THEODORE BORHEK, Bethlehem.
An Investigation of the Variations in Composition of Different Flushes of Blast Furnace Cinder in One Day's Working of the Furnace.

DAVID HOPE CHILDS, Towanda.
A Description of the Russell Process for the Lixiviation of Silver Ores, with a Discussion of the Applicability of this Process to the Treatment of the Ores of Parral, Chihuahua, Mexico.

JOSÉ MARIA GARZA GALÁN, JR., Saltillo, Mex.
The Extraction of Silver by the Patio Process at Parral, Chihuahua, Mexico.

RAFAEL FRANCISCO SANCHEZ, Gibara, Cuba.
Design of a Copper Smelting Plant for Treating the Ores of the La Palma Mine, Province of Santiago, Cuba.

FOR THE DEGREE OF ELECTRICAL ENGINEER.

PAUL BUCHER (with H. J. Horn), Lebanon.
Construction and Test of an Electrolytic Generator for Oxygen and Hydrogen.

HERBERT MYRON DAGGETT, JR., Elmira, N.Y.
Design of a Power Station for the New Orange Electric Railway.

EDGAR DAVIS EDMONSTON, Washington, D.C.
Plans for the Utilization of the Power of the Great Falls of the Potomac.

ROBERT EDWARD LEE GEORGE, Ellicott City, Md.
Construction and Tests of Electrodynamometers.

WILLIAM GRATZ (with H. C. Schwecke), Carmel, N.J.
Efficiency Tests of the Bichromate Battery.

RAYMOND HAZEL (with T. H. Lawrence), Cressona.
Plans and Specifications for a Municipal Lighting Plant.

HENRY B. HERSHEY (with S. A. Yorks, Jr.), Columbia.
Practical Tests of a Silk Mill Lighting Plant.

HERBERT HENNINGER HESS, Hellertown.
Plans for an Electric Railway from Hellertown to Coopersburg.

HAROLD JOHN HORN (with P. Bucher), South Bethlehem.
Construction and Test of an Electrolytic Generator for Oxygen and Hydrogen.

LEONARD SHERMAN HORNER, Marshall, Va.
Design of an Isolated Lighting Plant.

THOMAS H. LAWRENCE (with R. Hazel), Danville.
Plans and Specifications for a Municipal Lighting Plant.

CHARLES F. MORITZ (with L. Watts, Jr.), South Bethlehem.
Efficiency Tests of a Storage Battery.

HENRY CORD SCHWECKE (with W. Gratz), Charleston, S.C.
Efficiency Tests of the Bichromate Battery.

LEVI WATTS, JR. (with C. F. Moritz), Terre Hill.
Efficiency Tests of a Storage Battery.

SAMUEL A. YORKS, JR. (with H. B. Hershey), Danville.
Practical Tests of a Silk Mill Lighting Plant.

FOR THE DEGREE OF ANALYTICAL CHEMIST.

DANIEL JOHN BROUGHAL, South Bethlehem.
India Rubber and its Adulterations.

JOHN O'REILLY, South Bethlehem.
Glass and its Solubility in Water and Chemicals.

B. ROLAND SMOOT, Provo City, Utah.
Acetylene, its Formation and Properties.

HARRY BERNARD ZIMMELE, New York City.
Hydrogen Peroxide, its Manufacture, Properties, and Uses.

UNIVERSITY DAY.

This day is the last of the academic year, and falls in 1899 on the second Wednesday in June. On this day orations are delivered by members of the graduating class, and degrees are conferred.

EXERCISES ON JUNE 15, 1898.

MUSIC.

READING OF SCRIPTURE AND PRAYER.

MUSIC.

Salutatory Oration.—"The Value of Ideals."
EDGAR RAYMOND FRISBY.

MUSIC.

Oration.—"The Nicaragua Canal."
FRANK NORMAN KNEAS.

Oration.—"Advancement Due to the Engineer."
D'ARCY WENTWORTH ROPER.

MUSIC.

Alumni Address.—"Conditions of Professional Success."
FRANK PERLEY HOWE, A.B., E.M.,
Class of 1878.

MUSIC.

Valedictory Oration.—"Modern Warfare."
HAROLD JOHN HORN.

MUSIC.

Award of the Wilbur Scholarship to
ALBERT WILLIAM BAYARD, of Washington, D. C.,
first in rank in the Sophomore Class;
with honorable mention of
LOUIS ORTNER, of Drifton.

The Price Prize for English Composition, open to members of the Sophomore Class, was awarded to

ALBERT WILLIAM BAYARD, of Washington, D.C.,
with honorable mention of

GEORGE WILLIAM BARAGER, of Hazleton, and
JOSEPH STAUFFER SHULTZ, of Washington Boro.

The Wilbur Prizes, for excellence in the studies of Freshman year, were awarded as follows:

In Mathematics, to
THOMAS MERCER GIRDLER, of Jeffersonville, Ind., and
HENRY JARVIS MOORE, of Gill, Mass.

In German, to
JOHN WALLACE SHEAFFER, of Fleetwood.

In French, to
ERNESTO FRANCO, of Quito, Ecuador.

In English, to
EDWIN BENTON WILKINSON, of Williamsport, and
LEWIS ALFRED FREUDENBERGER, of Bethlehem.

In Freehand Drawing, to
JOHN JOSEPH NOLAN, of Carbondale.

In General Chemistry, to
NEWTON WAYNE BUCH, of Lancaster.

Degrees were then conferred by the President of the University upon the candidates whose names appear in the Thesis List, as given above.

THE WILBUR SCHOLARSHIP.

This Scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of $200 awarded annually to the student in the Sophomore Class having the best record.

THE ALUMNI SCHOLARSHIP FUND.

The Alumni Association of the University has established a Scholarship Fund, for the assistance of worthy students. Such assistance is to be given in the form of loans, secured by notes properly endorsed, subject to the following conditions:

1. That loans from this fund shall be made only to students in need of such help.

2. That help in this form shall not be given during the first year of any student's course; he must without this aid have gone through one year, and must be prepared to start the second year free from all conditions.

3. That help in this form shall not be continued to a student who shall at any time during his course carry any condition over eight weeks beyond the date of the examination in which he failed.

Subject only to the above conditions the disposal of the fund shall until otherwise directed be in the hands of the President of the University.

THE HENRY S. HAINES MEMORIAL SCHOLARSHIP.

Mrs. Henry S. Haines, of Savannah, Ga., established in 1889 a scholarship of the annual value of $200, which is to be devoted to the support at the Lehigh University, throughout his scholastic career, of one student in the School of Mechanical Engineering.

THE FRED. MERCUR MEMORIAL FUND SCHOLARSHIPS.

Friends of the late Frederick Mercur, desiring to establish a memorial of their friendship and esteem, and to perpetuate his memory, have contributed and placed in the hands of the Trustees a fund, to be called "The Fred. Mercur Memorial Fund," sufficient in amount to insure the award of several scholarships for free tuition in the University.

THE ECKLEY B. COXE MEMORIAL FUND.

In memory of the late Eckley B. Coxe, trustee of the University, Mrs. Coxe has established a Fund, amounting to $20,000, the interest of which is to be used, under the direction of the Trustees of the University, and subject to such regulations as they may adopt, for the assistance of students who without such aid would not be able to meet the cost of living as students of the University.

WILBUR PRIZES.

By the generosity of E. P. Wilbur, Esq., a fund has been established, yielding an annual income of $100, for distribution in prizes as the Faculty shall determine.

THE PRICE PRIZE FOR ENGLISH COMPOSITION.

Dr. Henry R. Price, an Alumnus and Trustee of the University, established in 1898 an annual prize of the value of $25, to be awarded in June to that member of the Sopho

more class who shall write the best essay on a topic in English Literature assigned by the head of the department of English not later than the beginning of the Second Term in each year.

In estimating the value of all such essays the greatest stress will be laid upon clearness of thought and idiomatic force of expression; and, in the judgment of the examiner, while looking for correctness of thought put into clear and forcible English, expression will take precedence of ideas. For this specific end, weight will be given to the form rather than to the matter presented.

Competitors must signify their intent not later than the first of May.

The subject for the prize essay in June, 1899, will be: "Tennyson's Dramatic Works."

ALUMNI PRIZES FOR ORATORY.

The "Alumni Association of the Lehigh University" established in 1882 an annual sum of Fifty Dollars, to be distributed in prizes for excellence in Oratory, subject to the following

REGULATIONS.

1. The Contest shall be held on the 22d day of February, or on the day designated by the University to commemorate the birthday of Washington.

2. There shall be a first prize of $25, a second of $15, and a third of $10.

3. To entitle one to be a competitor he must be a member of the Junior Class, taking a regular course.

4. Subjects for the orations shall be announced at the beginning of the first term of every year, and upon one of these each competitor shall write an oration not to exceed 1200 words, taking about eight minutes in delivery.

5. Each oration shall bear upon its first page a fictitious name or motto, and shall be accompanied by a sealed envelope, which shall be superscribed with the same name or motto, and an address by which it may be reclaimed.

The envelope shall contain the real name and address of the writer, with the declaration that the oration is his own original work. The examiner, having adopted a standard of excellence, may reject any or all of the orations presented which do not attain to this standard; of such as do —should they be sufficient in number—the best six shall be chosen, and their envelopes opened. The others shall be returned to the address given with their envelopes unopened.

6. The Executive Committee of the Alumni Association, or a committee of not fewer than three to be appointed by them, shall hear the competitors whose orations shall have been approved, and the awards shall be made by a majority of these judges.

7. In awarding the prizes the judges shall consider both the literary merits and the delivery of each oration.

8. These rules are subject to amendment by the Faculty.

The annual contest in Oratory for the Alumni Prizes was held on February 22, 1898, with the following competitors:

Robert Farnham, jr., of Washington, D. C.
William Lathrop Meaker, of Bethlehem.
George Loomis Robinson, of Elmira, N. Y.
Henry Anderson Wilcox, of West Granby, Conn.

The First Prize was awarded to Henry Anderson Wilcox; the Second to George Loomis Robinson; the Third to William Lathrop Meaker.

ENTRANCE EXAMINATION PAPERS.

Used for Examination in 1898.

I.—ENGLISH.

1. Define Rhetoric. Is it a science or an art? Compare it, in this respect, with grammar and logic.

2. What is the province of Style; its most essential element? Define Style. What is individuality in Style?

3. Define Diction. What cautions are to be observed about "present use" of words? About Latin or Saxon words? About provincial, technical, and archaic words?

4. What are figures of speech? When is their use appropriate? What figures promote clearness and concreteness? What is an abstract idea?

5. State the essentials of a good definition? Define any three common nouns on that plan. Define a *rule* and a *concrete example.*

6. State the rhetorical value of a Simile and a Metaphor. How do they differ? Upon what relation is Metonymy based? What are the natural defects of Allegory?

7. Meanings of Allegory, Personification, Antithesis; upon what principle is the latter based? What are a climax and an anti-climax? Is the latter ever allowable?

8. What is meant by Suspension? What is a balanced sentence; a loose sentence: a periodic sentence? What are synonyms, and on what principle are they to be distinguished and used? What are homonyms?

9 and 10. Write a short piece of descriptive prose of not more than 200 words on one of the following subjects: 1. The Plot of Macbeth. 2. The College for Women, in "The Princess."

II.—U. S. HISTORY AND CONSTITUTION.

1. Who proposed and who seconded the Compromise of 1850? What were its conditions?

2. Give the leading events, domestic and foreign, of the two terms of President Monroe's administration.

3. What were the provisions of the Fugitive Slave Law? What was its worst provision? What its effect?

4. What were the four parties at the Presidential election of 1860, and who were their candidates?

5. What were the great battles of 1862 in the East? In the West? What were the results of the year's operations?

6. What dispute was ended by the Treaty of Washington in 1871? What were the provisions of the treaty and how were they carried out?

7. What power over taxes is given to Congress? What power in relation to commerce?

8. What is the XIVth Amendment, and who has the power to enforce it?

9. What constitutes treason against the United States?

10. How was the President's election after Gen. Grant's second term settled?

III.—GEOMETRY.

1. *a.* Define Solid, Curved Surface, Corollary, Scholium, Polygon. *b.* Name the different triangles and give figure for each one.

2. The three perpendiculars from the vertices of a triangle to the opposite sides meet in the same point.

3. An inscribed angle is measured by half its intercepted arc.

4. Prob. *a.* To find the mean proportional to two given lines. *b.* To draw a tangent to a circle from a point outside.

5. Give a proof of the area of a trapezoid.

6. A circle has an area of 22 sq. ft. Find the number of centimeters in the radius of a circle having double this area.

7. *a.* Define Diedral Angle, Prism, Tetraedron, Ratio of Similitude, Polar Triangles. *b.* Show how to find the center of a given material sphere.

8. What is the measure of the angle of two great circles? Give proof.

9. Prove, a triangular pyramid is one-third of a triangular prism of the same base and altitude.

10. Given a pyramid whose base is 17 sq. ft., altitude 8 ft. At what distance from the vertex must a plane, parallel to the base, be passed in order to divide the pyramid into two equivalent solids?

IV.—ALGEBRA.

1. Simplify $\frac{x^2-y^2}{xy} - \frac{xy-y^2}{xy-x^2}$; also, $a^2 - \frac{1}{\frac{a^3-1}{a+\frac{1}{a+1}}}$

2. Express in simplest form $\sqrt[2]{27\,a^3\,b^5}$. Express as a whole number $(27)^{\frac{2}{3}} + (16)^{\frac{3}{4}} - \frac{2}{8^{-\frac{2}{3}}} + \frac{\sqrt[5]{2}}{(4)^{-\frac{2}{5}}}$.

3. Find L. C. M. of x^3+y^3, $3x^2+2xy-y^2$ and $x^3-x^2y+xy^2$.

4. Factor, $3x^3+6x^2-189x$; $x^{16}-y^{16}$; $x^2-\frac{x^2-1}{x+1}$.

5. Solve $\begin{cases} y = \frac{x+a}{2} + \frac{b}{3} \\ x = \frac{y+b}{2} + \frac{a}{3} \end{cases}$; also $\frac{x+3}{x-1} + \frac{x-4}{x-6} = 2$.

6. Solve $\sqrt{x+5} + \sqrt{3x+4} = \sqrt{12x+1}$.

7. How much are pears a gross when 12 more for a dollar lowers the price 5 cents a dozen?

8. Find a quantity such that when it is subtracted from each of the quantities a, b, c, the remainders are in continued proportion.

9. Find the divisor when $(4a^2 + 7ab + 5b^2)^2$ is the dividend, $8(a+2b)^2$ the quotient, and $b^2(9a + 11b)^2$ the remainder.

10. A lawn 50 ft. long and 34 ft. broad has a path of uniform width around it; if the area of the path is 55 sq. meters find its width in feet.

V.—PHYSICS.

1. A moving train on a straight, level track is acted upon by two forces, namely, the pull of the locomotive and the drag due to track and wind. Which of these forces is the larger while the train is gaining speed? Which is the larger while the train is losing speed? What is their relative value while the speed of the train is neither increasing nor decreasing? Justify your answer in each case by statements of Newton's Laws of Motion.

2. Considerable work has to be done in riding a bicycle, and in the doing of this work there are two distinct cases in which a rider feels a certain advantage.

(a) When a rider is about to climb a hill he feels it to be greatly to his advantage if he has considerable speed to start with. What is this *advantage of speed* called in mechanics?

(b) When a rider is on top of a hill he feels a certain advantage. What is this *advantage of position* called in mechanics?

3. State Archimedes's principle. What is meant by the Specific Gravity of a substance? Give a full explanation of a method for finding the specific gravity of a solid.

4. A pump with a piston one inch in diameter is used to pump water into a cylinder in which there is a piston fifteen

inches in diameter. A force of 5000 pounds acts upon the pump piston; calculate the force acting on the fifteen inch piston.

5. Why are the temperatures of freezing water and of boiling water (at standard pressure) taken as reference or standard temperatures in Thermometry? Given an ordinary thermometer without graduations of any kind, explain in detail the method of making the graduations.

6. A pound of coal when burned gives off enough heat to raise the temperature of 1000 pounds of water from 35°F. to 46°F. Find the amount of ice which one pound of coal wiil melt and the amount of water at the boiling point which one pound of coal will vaporize. In this calculation consider that to melt one pound of ice requires as much heat as would raise the temperature of 10 pounds of water 14.6 Fahrenheit degrees, and that to vaporize one pound of water at the boiling point requires as much heat as would raise the temperature of 10 pounds of water 96 Fahrenheit degrees.

7. What is the name of the process by means of which heat is transmitted from the sun to the earth? Give other examples of the same process. By what means (mainly) is heat distributed throughout a vessel of water on a stove? What is the name of this process? Give other examples of it. What is the name of the process by means of which heat is carried along a metal rod? Name several substances in the order of the facility with which they transmit heat by this last process.

8. The temperatures of boiling water on a high mountain, at sea level, and in a boiler which furnishes steam for a steam engine, are different. Which is the hottest and which the coolest? What is it that causes the boiling point of water to be different in these different cases?

9. Describe the three fundamental phenomena of the electric current and describe practical applications of electricity exemplifying each.

10. An iron rod is wound with insulated wire. What is the effect on the rod when an electric current is sent

through the wire? What is such an arrangement called? Name several practical appliances of each of which the above is an essential part.

11. An ordinary electric bell continues to ring so long as the push-button is depressed. Make a diagram showing the electrical connections of such a bell, including push-button and battery, and explain the vibratory action of the bell.

12. Draw a diagram showing the electrical connections of sounder, local battery, relay, and key, at an ordinary telegraph station, and explain the action and use of the relay.

13. What is the physical difference between a noise and a musical tone? Musical tones may differ in loudness, in pitch, and in timbre or quality; explain the physical basis of each.

VI.—GERMAN.

1. Decline ,,jenes schöne Haus," ,,die kleine Rose", ,,welcher Knabe", in singular and plural.

2. Give genitive and nominative plural, gender, and meaning of the following nouns:

Schiff, Ring, Mutter, Pferd, Mädchen, Land, Stadt, Zeit.

3. Write out synopsis (third person singular) of ,,reden", ,,anziehen".

4. Give third person Singular, Present, Imperfect, and Perfect Tenses (Indic. and Subj.) of following verbs: reiten, raten, bleiben, aussteigen, thun, geschehen, stossen, schwingen.

5. Give the peculiarities in the conjugation of auxiliary verbs of mood; are both auxiliaries used in the compound tenses of the past?

6. What is the principal difference in the use of the Relative Pronoun in English and in German? Give examples.

Translate into German:

1. When I arrived yesterday it was very dark, to-day I did not arrive so late.

2. Has it been warm to-day? No, it has been cooler than yesterday.

3. He has been seen in the park by the sons of the King

4. She did not work willingly[1] but she was compelled[2] to work the whole day.

5. That is the lady who has the pretty daughters I saw on the street.

6. If I had known of his father's death, I would have written him.

1 gern. 2 müssen.

Translate into English:

Ich bin in Philadelphia geboren. Meine Eltern sind beide Amerikaner. Ich habe noch einen Bruder und zwei Schwestern, welche sämtlich älter sind als ich. Von meinem sechsten bis zum achten Jahre besuchte ich die William-Penn-Schule meiner Vaterstadt. Im Jahre 1887 zog ich mit meinen Eltern und Geschwistern nach der Bundeshauptstadt Washington, wo mein Vater eine Regierungsanstellung[1] im Patent-Amt erhalten hatte. Bis zum Juni 1894 besuchte ich die Webster-Schule, eine der öffentlichen Schulen im District Columbia, und im September desselben Jahres trat ich als Schüler in die Central-Hochschule in Washington ein. Ich erwählte[2] den akademischen Kursus, weil ich ein grosses Interesse für das Studium der Sprachen fühlte. In meinen ersten beiden Jahren in der Hochschule beschäftigte ich mich hauptsächlich mit englischer Sprache und Litteratur, mit Lateinisch und Griechisch, sowie mit römischer und griechischer Geschichte. Während des dritten und vierten Jahres wurde Deutsch mein Lieblingsstudium.[3]

Es ist der Wunsch meiner Eltern, dass ich meine Sprachstudien die nächsten vier Jahre in Yale College fortsetzen[4] und dann noch ein paar Jahre eine deutsche Universität besuchen soll. Meine Absicht ist, Sprachlehrer an einer höheren Schule meines Vaterlandes zu werden.

1 Government position. 2 to choose. 3 favorite study.
4 to continue.

VII.—FRENCH.

1. Give the relative pronouns and how they are used; state principal difference in the use of the relative pronoun in French and in English, and give example.

2. Give meaning, and form feminine of the following adjectives:

Honnête, bon, beau, malheureux, vieux, blanc, petit, fou.

Give meaning and form plural of the following nouns:

Chapeau, cheval, ciel, oeil, fils, nez, bijou, fou.

3. Give principal parts of the following verbs:

Savoir, écrire, tenir, pouvoir, lire, partir, devoir, falloir.

4. Give first and third person, Singl. and Plural, Present, Perfect and Preterite Tenses (Indic. and Subj.) of faire, aller, naître, suivre, mettre, venir.

5. When does the past participle in a compound tense agree with the subject? When with the object? and when does it remain unchanged? Give examples.

Translate into French:

1. Do not give it to him; give it to me.

2. Is the master not loved by every one?

3. He is hungry but he is too warm, and cannot eat anything.

4. At what hour was my father here yesterday? He told him he was ninety-two years old.

5. The trees are in the garden behind the house and the fruit is on the trees, and under the trees there is much shade.[1]

1 ombre.

Interrompu au milieu de la délibération, Hadgi-Stavros fit à ses prisonnières un accueil[1] glacial. Il n'offrit pas même un verre d'eau à Mme Simons, et comme elle n'avait point déjeuné, elle fut sensible à cet oubli de [2]convenances. Je pris la parole au nom des Anglaises, et, en l'absence de Corfiote, le Roi fut bien forcé de m'accepter pour intermédiaire. Je lui dis, qu'après le désastre de la veille,[3] il serait content d'apprendre la détermination de Mme Simons; qu'elle avait résolu de payer dans le plus bref délai, sa ran-

çon et la mienne; que les [4]fonds seraient [5]versés le lendemain, soit à la banque d'Athènes, soit en tout autre lieu qu'il lui plairait de désigner, contre son reçu.

"Je suis bien aise, dit-il, que ces femmes aient renoncé à convoquer l'armée grecque à leur secours. Dites leur qu'on leur remettra, pour la seconde fois, tout ce qu'il faut pour écrire; mais qu'elles n'abusent plus de ma confiance! qu'elles ne m'attirent pas les soldats ici!

1 reception. 2 good manners. 3 eve. 4 money. 5 to pay over.

VIII.—LATIN.

I. Grammar.

Decline *locus*, *lacus*, *lac*, *lex*, *deus*, *Anchises*, *respublica*.

Decline the following words in all three genders: the relative pronoun, *ipse*, *idem*, *tristior*, *nequam*, *liber*, *celer*.

Compare *idoneus*, *senex*, *prior*, *providus*, *acer*, *male*.

Give the ordinal numbers from fifth to fifteenth.

Give the following verb synopses: *aro* through the active voice in the third person singular; *doceo* in second person in the passive; *tego* in third person of the passive.

Inflect *soleo* complete in subjunctive mood.

Give all the participles of *hortor*.

Inflect *eo* in indicative complete, and *malo* in the subjunctive.

State the different ways of expressing purpose and give examples.

Give the different uses of the genitive case.

What are the various forms of the conditional sentence?

II. Cæsar.

Translate the following passages and answer the questions upon them:

1. (*Bk. I*, 45.) Multa ab Cæsare in eam sententiam dicta sunt, quare negotio desistere non posset, et neque suam

neque populi Romani consuetudinem pati, uti optime merentes socios desereret, neque se judicare, Galliam potius esse Ariovisti quam populi Romani. Bello superatos esse Arvernos et Rutenos ab Q. Fabio Maximo, quibus populus Romanus ignovisset neque in provinciam redegisset neque stipendium imposuisset. Quodsi antiquissimum quodque tempus spectari oporteret, populi Romani justissimum esse in Gallia imperium; si judicium senatus observari oporteret, liberam esse Galliam, quam bello victam suis legibus uti voluisse.

Write verbs in the moods and tenses of the Direct Discourse. Give syntax of *negotio*, *Ariovisti*, *bello*, *legibus*.

2. (*Bk. III*, 23.) Armis obsidibusque acceptis Crassus in fines Vocatium et Tarusatium profectus est. Tum vero barbari commoti, quod oppidum et natura loci et manu munitum paucis diebus, quibus eo ventum erat, expugnatum cognoverant, legatos quoquoversum demittere, conjurare, obsides inter se dare, copias parare coeperunt. Mittuntur etiam ad eas civitates legati, quae sunt citerioris Hispaniae finitimae Aquitaniae: inde auxilia ducesque arcessuntur.

III. Vergil.

Translate (*Aen. Bk. II*, *line* 705).

Dixerat ille : et jam per moenia clarior ignis
auditur, propiusque aestus incendia volvunt.
'Ergo age, care pater, cervici imponere nostrae ;
ipse subibo umeris, nec me labor iste gravabit :
quo res cumque cadent, unum et commune periclum,
una salus ambobus erit. Mihi parvus Iulus
sit comes, et longe servet vestigia conjunx :
vos, famuli, quae dicam, animis advertite vestris.

Give principal parts of the verbs. Write out the first two lines, marking the feet and the cæsura.

(*Aen. Bk. IV*, *line* 296.)

At regina dolos—quis fallere possit amantem ?
Praesensit, motusque excepit prima futuros,

omnia tuta timens. Eadem impia Fama furenti
detulit armâri classem cursumque parari.
Saevit inops animi, totamque incensa per urbem
bacchatur, qualis commotis excita sacris
Thyias, ubi audito stimulant trieterica Baccho
orgia, nocturnusque vocat clamore Cithaeron.

IV.—Cicero.

(*In Catilinam*, *II*, 4.) Quod exspectavi, jam sum adsecutus, ut vos omnes factam esse aperte conjurationem contra rem publicam videretis: nisi vero si quis est qui Catilinae similis cum Catilina sentire non putet. Non est jam lenitati locus: severitatem res ipsa flagitat. Unum etiam nunc concedam: exeant, proficiscantur; ne patiantur desiderio sui Catilinam miserum tabescere. Demonstrabo iter: Aurelia via profectus est: si adcelerare volent, ad vesperam consequentur.

(*In Catilinam*, *IV*, 4.) Video adhuc duas esse sententias: unam D. Silani, qui censet eos, qui haec delere conati sunt, morte esse multandos; alteram C. Caesaris, qui mortis poenam removet, ceterorum suppliciorum omnis acerbitates amplectitur. Uterque et pro sua dignitate et pro rerum magnitudine in summa severitate versatur. Alter eos qui nos omnes, qui populum Romanum, vita privare conati sunt, qui delere imperium, qui populi Romani nomen exstinguere, punctum temporis frui vita et hoc communi spiritu non putat oportere; atque hoc genus poenae saepe in improbos civis in hac re publica esse usurpatum recordatur.

What was the legal point involved in this question? Give syntax of *morte*, *vita*, *punctum*.

(*Pro Archia poeta*, 3.) Nam ut primum ex pueris excessit Archias, atque ab eis artibus quibus aetas puerilis ad humanitatem informari solet se ad scribendi studium contulit, primum Antiochiae—nam ibi natus est loco nobili—celebri quondam urbe et copiosa, atque eruditissimis hominibus liberalissimisque studiis adfluenti, celeriter

antecellere omnibus ingeni gloria contigit. Post in ceteris Asiae partibus cunctaeque Graeciae sic ejus adventus celebrabantur, ut famam ingeni exspectatio hominis, exspectationem ipsius adventus admiratioque superaret.

V.—Sight Reading.

(*Caes. De Bello Civili, Bk. I*, 70.) Erat in celeritate omne positum certamen, utri prius angustias montesque occuparent; sed exercitum Caesaris viarum difficultates tardabant, Afranii copias equitatus Caesaris insequens morabatur. Res tamen ab Afranianis huc erat necessario deducta, ut, si priores montes, quos petebant, attigissent, ipsi periculum vitarent, impedimenta totius exercitus cohortisque in castris relictas servare non possent; quibus interclusis exercitu Caesaris auxilium ferri nulla ratione poterat.

VI. Latin Prose Composition.

Translate into Latin:

In eight years Caesar subdued the whole of Gaul and joined it to the empire of Rome. Being called hence by the outbreak of the civil war he hastened to march to Rome with forced marches in order to attack Pompey, who had attempted to deprive him of power. If he had remained longer in Farther Gaul he might have conquered Britain, which he had visited, but not occupied. After his victory at Pharsalus he was made dictator, and ruled the Roman Empire until his death.

VII. Roman History.

1. Who was Servius Tullius, and what was he said to have done for the development of the Roman Constitution?
2. Give an account of the destruction of Rome by the Gauls.
3. Give the chief events of the First Punic War.
4. Relate the story of Marius.
5. Give the career of Tiberius Gracchus.

IX.—GREEK.

I. Grammar.

1. Contract *τιμάουσι, φιλέετε, δήλοε, σῶος.*

Write correctly *ἰδ-θι, λελειπ-σαι, δεδεχ-μαι, συν-γιγνομαι, θεντ-ς, πεπλεκ-σθε.*

Through what euphonic changes are *στέλλω, τείνω, θάσσων, ἐλπίζω* formed?

2. Give with accent acc. sing. of *ἀληθεια, πειρα*; gen. sing. of *δεσποινα, εὔνοια*; voc. sing. of *γεωμέτρης, δεσπότης.*

3. Prefix the article indicating the case of each of the following: *νεῴ, συκᾶν, πλοῦς, νώ, ὀστᾶ.*

4. Give gen., acc., and voc., both sing. and plur., of *θρίξ, γέρας, τεῖχος, πῆχυς, ἰχθύς, ναῦς, γαστήρ, ἀστήρ, γόνυ.*

5. Give gen. and acc. sing., and dat. and acc. plur., all genders, of *ὑγιής, γλυκύς, πᾶς, δούς, χαρίεις.*

6. Give other degrees of comparison to *χαρίεις, βελτίων, ἥδιον, βεβαίως, μάλιστα.*

7. Write (in Greek) cardinal numbers to the figures *ι′, ιδ′, ρ′*; also ordinal adjectives and numeral adverbs.

8. Conjugate act. pres. indic. of *ζάω*; act. pres. opt. of *δηλόω*; act. perf. ind. of *ἵστημι.* Give synopsis of act. aor. of *δίδωμι*; pass. aor. of *τίθημι.*

9. *φανῶ, λυθῶ, τεθῶ, ἐτύψω*: where made? Give in each case the first person singular (a) of the optative in the same tense; (b) of the present indicative.

II. Xenophon.

Translate:

Καὶ εἰς μὲν τὴν ὑστεραίαν οὐχ ἥκεν· ὥσθ' οἱ Ἕλληνες ἐφρόντιζον· τῇ δὲ τρίτῃ ἥκων ἔλεγεν ὅτι διαπεπραγμένος ἥκοι παρὰ βασιλέως δοθῆναι αὐτῷ σώζειν τοὺς Ἕλληνας, καίπερ πάνυ πολλῶν ἀντιλεγόντων ὡς οὐκ ἄξιον εἴη βασιλεῖ ἀφεῖναι τοὺς ἐφ' ἑαυτὸν στρατευσαμένους. τέλος δὲ εἶπε, Καὶ νῦν ἔξεστιν ὑμῖν πιστὰ λαβεῖν παρ' ἡμῶν ἢ μὴν φιλίαν παρέξειν ὑμῖν τὴν χώραν καὶ ἀδόλως ἀπάξειν εἰς τὴν Ἑλλάδα ἀγοράν παρέχοντας· ὅπου δ' ἂν μὴ ᾖ πρίασθαι, λαμβάνειν ὑμᾶς ἐκ τῆς χώρας ἐάσομεν τὰ ἐπιτήδεια. ὑμᾶς δ' αὖ ἡμῖν δεήσει ὀμόσαι ἢ μὴν πορεύσεσθαι ὡς διὰ φιλίας ἀσινῶς σῖτα καὶ ποτὰ λαμβάνοντας ὁπόταν μὴ ἀγορὰν παρέχωμεν· ἣν δὲ παρέχωμεν ἀγορὰν, ὠνουμένους ἔξειν τὰ ἐπιτήδεια.

Write the quotation *διαπεπραγμένος . . . στρατευσαμένους* in the form of direct discourse.

Give the principal parts of *ἀφεῖναι, λαβεῖν, πρίασθαι, ὀμόσαι.*

Explain construction of *ὑστεραίαν, τρίτῃ, δοθῆναι, πολλῶν*; explain use of each participle.

Translate:

Ἔνθα δὴ οἱ Ἕλληνες ἔγνωσαν ὅτι πλαίσιον ἰσόπλευρον πονηρὰ τάξις εἴη πολεμίων ἑπομένων. ἀνάγκη γάρ ἐστιν, ἢν μὲν συγκύπτῃ τὰ κέρατα τοῦ πλαισίου, ἢ ὁδοῦ στενωτέρας οὔσης, ἢ ὀρέων ἀναγκαζόντων ἢ γεφύρας, ἐκθλίβεσθαι τοὺς ὁπλίτας, καὶ πορεύεσθαι πονηρῶς, ἅμα μὲν πιεζομένους, ἅμα δὲ καὶ ταραττομένους· ὥστε δυσχρήστους εἶναι ἀνάγκη ἀτάκτους ὄντας. ὅταν δ' αὖ διάσχῃ τὰ κέρατα, ἀνάγκη διασπᾶσθαι τοὺς τότε ἐκθλιβομένους, καὶ κενὸν γίγνεσθαι τὸ μέσον τῶν κεράτων, καὶ ἀθυμεῖν τοὺς ταῦτα πάσχοντας, πολεμίων ἑπομένων. καὶ ὁπότε δέοι γέφυραν διαβαίνειν, ἢ ἄλλην τινὰ διάβασιν, ἔσπευδεν ἕκαστος βουλόμενος φθάσαι πρῶτος· καὶ εὐεπίθετον ἦν ἐνταῦθα τοῖς πολεμίοις.

Explain the construction of *εἴη, συγκύπτῃ, ἀναγκαζόντων, δυσχρήστους εἶναι, δέοι.*

Translate (at sight):

Ἐπεὶ δ' ἀφίκοντο πρὸς χωρίον ὃ πόλιν μὲν οὐκ εἶχεν οὐδ' οἰκίας, συνεληλυθότες δ' ἦσαν αὐτόσε καὶ ἄνδρες καὶ γυναῖκες καὶ κτήνη πολλὰ, Χειρίσοφος μὲν πρὸς τοῦτο προσέβαλλεν εὐθὺς ἥκων· ἐπειδὴ δὲ ἡ πρώτη τάξις ἀπέκαμνεν, ἄλλη προσῄει καὶ αὖθις ἄλλη· οὐ γὰρ ἦν ἀθρόοις περιστῆναι, ἀλλὰ ποταμὸς ἦν κύκλῳ. ἐπειδὴ δὲ Ξενοφῶν ἦλθε σὺν τοῖς ὀπισθοφύλαξι καὶ πελτασταῖς καὶ ὁπλίταις, ἐνταῦθα δὴ λέγει Χειρίσοφος· Εἰς καλὸν ἥκετε· τὸ γὰρ χωρίον αἱρετέον· τῇ γὰρ στρατιᾷ οὐκ ἔστι τὰ ἐπιτήδεια, εἰ μὴ ληψόμεθα τὸ χωρίον. Ἐνταῦθα δὴ κοινῇ ἐβουλεύοντο· καὶ τοῦ Ξενοφῶντος ἐρωτῶντος τί τὸ κωλῦον εἴη εἰσελθεῖν, εἶπεν ὁ Χειρίσοφος· Μία αὕτη πάροδός ἐστιν ἣν ὁρᾷς· ὅταν δέ τις ταύτῃ πειρᾶται παριέναι, κυλίνδουσι λίθους ὑπὲρ ταύτης τῆς ὑπερεχούσης πέτρας· ὃς δ' ἂν καταληφθῇ, οὕτω διατίθεται. ἅμα δ' ἔδειξε συντετριμμένους ἀνθρώπους καὶ σκέλη καὶ πλευράς.

III. Homer.

"ὤμοι, τέκνον ἐμὸν, τί νύ σ' ἐτρεφον αἰνὰ τεκοῦσα;
αἴθ' ὄφελες παρὰ νηυσὶν ἀδάκρυτος καὶ ἀπήμων
ἧσθαι, ἐπεί νύ τοι αἶσα μίνυνθά περ, οὔτι μάλα δήν.
νῦν δ' ἅμα τ' ὠκύμορος καὶ ὀϊζυρὸς περὶ πάντων

ἔπλεο · τῷ σε κακῇ αἴσῃ τέκον ἐν μεγάροισιν.
τοῦτο δέ τοι ἐρέουσα ἔπος Διὶ τερπικεραύνῳ
εἶμ᾽ αὐτὴ πρὸς Ὀλυμπον ἀγάννιφον, αἴ κε πίθηται.

By whom were these words said? To whom? On what occasion? To what does *αἴσα* refer?

Explain construction of *τί, ἤσθαι, τῷ, αἴσῃ.*

Give prose forms of *νηυσίν, ἐρέουσα, αἴ κε.*

Mark quantities, feet, and caesuras.

Ἀλλ᾽ ὅτε δή ῥ᾽ ἵκοντο μετὰ Τρῶας καὶ Ἀχαιοὺς,
ἐξ ἵππων ἀποβάντες ἐπὶ χθόνα πουλυβότειραν
ἐς μέσσον Τρώων καὶ Ἀχαιῶν ἐστιχόωντο.
ὤρνυτο δ᾽ αὐτίκ᾽ ἔπειτα ἄναξ ἀνδρῶν Ἀγαμέμνων,
ἂν δ᾽ Ὀδυσεὺς πολύμητις · ἀτὰρ κήρυκες ἀγαυοὶ
ὅρκια πιστὰ θεῶν σύναγον, κρητῆρι δὲ οἶνον
μίσγον, ἀτὰρ βασιλεῦσιν ὕδωρ ἐπὶ χεῖρας ἔχευαν.
Ἀτρείδης δὲ ἐρυσσάμενος χείρεσσι μάχαιραν,
ἥ οἱ πὰρ ξίφεος μέγα κουλεὸν αἰὲν ἄωρτο,
ἀρνῶν ἐκ κεφαλέων τάμνε τρίχας · αὐτὰρ ἔπειτα
κήρυκες Τρώων καὶ Ἀχαιῶν νεῖμαν ἀρίστοις.

Give present form of *ἵκοντο, ἐστιχόωντο, ὤρνυτο, ἔχευαν, ἄωρτο, νεῖμαν.*

δ᾽ (lines 4, 5); *δέ* (lines 6, 8): why is *ε* elided in the former cases and not in the latter?

IV. History.

1. Give an account of Miltiades; of Cimon; of Pericles.

2. Describe the battle of Salamis.

3. How did Athens become powerful and how did she lose her power?

4. Who were the Thirty Tyrants?

5. Describe the career of Epaminondas.

STUDENTS.

Clas.—Classical.
L.S.—Latin-Scientific.
Sci.—Science and Letters.
A.C.—Analytical Chemistry.
C.E.—Civil Engineering.
E.M.—Mining Engineering.
M.E.—Mechanical Engineering.
E.E.—Electrical Engineering.
Arch.—Architecture.

GRADUATE STUDENTS.

	For Degree.	Residence.
Noble C. Banks, B.S.,	E.M.,	Telluride, Colo.
Henry Theodore Borhek, B.S.,	E.M.,	Bethlehem.
Henry M. S. Cressman, B.A.,	M.A.,	Egg Harbor City, N.J.
George Davies, M.E.,	M.S.,	Catasauqua.
Walter Joseph Dech, B.A.,	M.A.,	Myerstown.
Frank Oliver Dufour, C.E.,	M.S.,	South Bethlehem.
Natt M. Emery, B.A.,	M.A.,	Bethlehem.
José M. G. Galàn, B.S.,	E.M.,	Saltillo, Mex.
Elmer Aug. Jacoby, B.A.,	M.A.,	Pennsburg.
Henry Kemmerling, C.E.,	M.S.,	Scranton.
John Henry Klinck, M.E.,	M.S.,	South Bethlehem.
William A. Lambert, B.A.,	M.A.,	Bethlehem.
Robert Edw. Laramy, B.A.,	M.A.,	Bethlehem.
John Thomas Morrow, M.E.,	E.E.,	Great Falls, Montana.
David K. Nicholson, M.E.,	M.S.,	Braddock.
Percy Lawrence Reed, C.E.,	M.S.,	New Bedford, Mass.
Rafael Francisco Sanchez, B.S.,	E.M.,	Gibara, Cuba.
James A. Singmaster, B.A.,	A.C.,	Allentown.
John Eugene Stocker, B.S.,	M.S.,	Bethlehem.
Clinton G. Tudor, B.S.,	C.E.,	Sault Ste. Marie, Mich.
Warren Worthington, M.E.,	B.S. (Met.),	Rushland.

SENIOR CLASS.

	Course.	Residence.
George Fred Allen,	C.E.,	Florida, N.Y.
Leon Whetstone Bailey,	E.E.,	Delano.
Richard Charles Becerra, jr.,	A.C.,	Caracas, Venezuela.
Maurice Clark Benedict,	M.E.,	Altoona.
Arthur Knode Birch,	E.E.,	Washington, D.C.
Frank Elliott Bradenbaugh,	M.E.,	Parkersburg, W. Va.
John Morgan Buckland,	Sci.,	Hokendauqua.
José Fernando Capriles,	C.E.,	Puerto Cabello, Venezuela.
Charles Ford Carman,	C.E.,	Cedarville, N.J.
Bernard Todd Converse,	M.E.,	Louisville, Ky.
John Peter Croll,	C.E.,	Trexlertown.
Rudolph Degener,	M.E.,	New York City.
George Armstrong Dornin,	M.E.,	Newport News, Va.
Robert Farnham, jr.,	C.E.,	Washington, D.C.
José Gervasio Gandia,	C.E.,	San Juan, Porto Rico.
Eugene Gifford Grace,	E.E.,	Goshen, N.J.
John Wesley Grace, jr.,	E.E.,	Goshen, N.J.
William Gummere,	A.C.,	South Bethlehem.
Oscar Cooper Hannum,	C.E.,	Philadelphia.
George Augustus Horne,	A.C.,	Plainfield, N.J.
Roy Rhodes Hornor,	E.M.,	Clarksburg, W.Va.
George Reifsnyder Jackson,	C.E.,	Scranton.
Alexander T. Johnson,	E.M.,	Towanda.
Duncan Kennedy, jr.,	E.E.,	Detroit, Mich.
Edward Allen Keys,	C.E.,	Linden, Md.
Russell Kimball,	M.E.,	New York City.
Arthur Warner Klein,	M.E.,	Bethlehem.
Richard Skerrett Landron,	C.E.,	San Juan, Porto Rico.
Frederick John Littell,	M.E.,	Erie.
Geo. Kennedy McGunnegle,	A.C.,	Meadville.
Owen Gray MacKnight,	E.E.,	Philadelphia.
Charles Michael Masson,	M.E.,	Rheims, N.Y.
William Lathrop Meaker,	A.C.,	Bethlehem.
James Flanders Middledith,	M.E.,	Plainfield, N. J.
J. Foster Morgan,	E.E.,	Harwood Mines.

	Course.	Residence.
Charles G. Newton,	C.E.,	Guadalajara, Mex.
Henry Ralph Palmer,	M.E.,	West Chester.
John Read Pettit,	E.M.,	Philadelphia.
Louis Thomas Rainey,	E.E.,	Decatur, Ill.
Percy Lesley Reed,	C.E.,	Altoona.
Victor Hugo Reid,	C.E.,	Brooklyn, N.Y.
Gustavo Rovelo,	M.E.,	Comitan-Chiapas,Mex.
Henry Harger Scovil,	M.E.,	Copenhagen, N.Y.
Abraham Shimer,	M.E.,	West Bethlehem.
William Harold Speirs,	Arch.,	St. Louis, Mo.
Abram Peters Steckel,	E.E.,	Lykens.
Robert Maximilian Straub,	C.E.,	Pittsburg.
William Frederick Ulrich,	A.C.,	Bethlehem.
John Sage Viehe,	E.E.,	Atlanta, Ga.
Frederick Charles Wettlaufer,	A.C.,	New York City.
Harry Anderson Wilcox,	C.E.,	West Granby, Conn.
George Herbert Wood,	M.E.,	Chambersburg.

JUNIOR CLASS.

	Course.	Residence.
Louis Benjamin Abbott,	C.E.,	Carbondale.
George William Barager,	M.E.,	Hazleton.
Albert William Bayard,	M.E.,	Washington, D. C.
Berthold Graeff Beck,	E.E.,	West Bethlehem.
Thomas Francis Bell,	M.E.,	Shenandoah.
John Francis Benson,	C.E.,	Portsmouth, Va.
Edwin Percy Bigelow,	E.E.,	Oxford, N. J.
Russell Julian Borhek,	C.E.,	West Bethlehem.
Reginald Weller Bours,	C.E.,	Jacksonville, Fla.
John Hall Bower,	E.M.,	Myerstown.
Henry Lawton Bowers,	A.C.,	Rome, N. Y.
Andrew Thomas Brice,	E.E.,	New York City.
John James Brice,	C.E.,	New York City.
Joseph William Burke,	E.M.,	Shenandoah.
David Hastings Canfield,	Arch.,	Middletown, N. Y.
Robert William Canning,	M.E.,	South Bethlehem.
Morrow Chamberlain,	E.M.,	Chattanooga, Tenn.

	Course.	Residence.
Hugh Banks Chapman,	E.E.,	St. Elmo, Tenn.
Richard Cromwell Congdon,	M.E.,	Baltimore, Md.
Robert Milton Cortright,	A.C.,	Bethlehem.
George Curtis Coutant,	M.E.,	High Falls, N. Y.
John Kenelm Digby,	E.M.,	Paris, France.
Herbert Charles Dilliard,	C.E.,	East Bangor.
Alan Craig Dodson,	L.S.,	Bethlehem.
Truman Monroe Dodson, 2d,	Sci.,	Bethlehem.
Gavin Hogg Dortch,	M.E.,	Goldsboro, N. C.
William T. Drake,	M.E.,	Old Forge.
Nimson Eckert,	Clas.	Allentown.
John William Fletcher,	M.E.,	Skowhegan, Me.
Richard McNamee Freeman,	E.E.,	Andover, N. J.
John Fuller,	M.E.,	Quarryville, N. J.
Author Hendrix Gill,	M.E.,	Boring, Md.
James Henry Gledhill,	M.E.,	Riegelsville.
Herbert Terry Greene,	E.M.,	New York City.
Frederick Augustus Groff,	E.E.,	Rome, N. Y.
Charles Frederick Gross,	C.E.,	Belvidere, N. J.
William B. Grubbe,	C.E.,	Pine Plains, N. Y.
Arthur Bradley Hanscom,	C.E.,	Philadelphia.
John George Heinz,	E.M.,	Louisville, Ky.
Albert Darby Hollingsworth,	C.E.,	Scotch Plains, N.J.
Michael James Honan,	E.E.,	Oxford, N.J.
Edward Melville Huggins,	M.E.,	Philadelphia.
Clark Miles Knight,	M.E.,	Bethlehem.
John Edward Leibfried,	A.C.,	Bethlehem.
Leroy Streeper Leopold,	M.E.,	Pottstown.
William Grant Lessig,	M.E.,	Shenandoah.
Herbert Spencer Lewis,	C.E.,	Baltimore, Md.
Thomas Windle Lukens,	E.M.,	Atglen.
Charles Edward Terry Lull,	E.M.,	Trenton, N.J.
Garth Bainbridge Luten,	C.E.,	Cayce, Ky.
William Thomas McCarthy,	Arch.,	Schenectady, N.Y.
Kenneth Wesley McComas,	A.C.,	South Bethlehem.
David Graham McGavock,	E.M.,	Graham's Forge, Va.
William George McVey,	C.E.,	South Bethlehem.

	Course.	Residence.
Carl Edward Maeder,	M.E.,	Pittsburg.
Joseph Patrick Martin,	C.E.,	Plymouth.
J. Louis Meixell,	M.E.,	Parsons, Kan.
Harry Maxwell Menner,	A.C.,	Bethlehem.
Manual de la Mora,	C.E..	Guadalajara, Mex.
George Rohrer Morrow,	E.M.,	Highspire.
Louis Ortner,	M.E.,	Drifton.
Arthur Rose Parsons,	E.M.,	Salt Lake City, Utah.
Frederick Jay Payne,	M.E.,	Copenhagen, N.Y.
Clarence Marion Pflueger,	A.C.,	Seidersville.
John Hazelrod Pomeroy,	M.E.,	Ridley Park.
Norman Spearman Powell,	E.M.,	West Middlesex.
Joseph Jacob Reamer,	C.E.,	Waterloo, N.Y.
James Burr Reddig,	M.E.,	Shippensburg.
John Nicholas Reese,	C.E.,	Harrisburg.
George Loomis Robinson,	C.E.,	Elmira, N.Y.
Walter Henry Rodney,	C.E.,	Baltimore, Md.
Ferdinand W. Roebling, jr.,	M.E.,	Trenton, N. J.
James George Ross,	C.E.,	Kittanning.
Charles Edward Rowe,	M.E.,	Philadelphia.
Alfredo Jorge Sanchez,	A.C.,	Matanzas, Cuba.
Armando Sanchez,	E.M.,	Nuevitas, Cuba.
Edmund Trowbridge Satchell,	A.C.,	Philadelphia.
Joseph Stauffer Shultz,	C.E.,	Washington Boro.
Charles Sylvanus Snyder,	M.E.,	South Bethlehem.
Arturo Solorzano,	M.E.,	Managua, Nicaragua.
William Paul Starkey,	M.E.,	Philadelphia.
John Alvin Strauss,	E.E.,	Sayre.
Henry Adolph Tobelmann,	E.M.,	Basking Ridge, N. J.
John Ralph VanDuyne,	C.E.,	Newark, N. J.
William Penn White,	E.E.,	Washington, D.C.
William Townsend White,	Arch.,	Williamsport.
Toros Asadur Yasharian,	E.E.,	Hedjin, Armenia.
Edward Abraham Yellis,	Sci.,	Weaversville.
Edward Robins Zalinski,	E.M.,	Rochester, N. Y.

SOPHOMORE CLASS.

	Course.	Residence.
Samuel Ray Alder,	E.M.,	Redlands, Cal.
Paul Lewis Anderson,	E.E.,	Somerville, N. J.
Joaquim Gregoriano de Andrade,	M.E.,	Manáos, Brazil.
Frederic Arthur Armstrong,	E.E.,	Brooklyn, N. Y.
Charles Elmer Barba,	M.E.,	South Bethlehem.
Richard Boone,	M.E.,	South Bethlehem.
Newton Wayne Buch,	A.C.,	Lancaster.
Timothy Burns,	M.E.,	Yankton, S.D.
Louis Philip Henry Butler,	M.E.,	Croton Falls, N.Y.
Albert Adam Canning,	E.M.,	South Bethlehem.
William Deakins Cassin,	E.E.,	Washington, D.C.
James Hamilton Chickering,	M.E.,	Oil City.
David Bean Clark,	Clas.,	Richlandtown.
John Henry Crane,	E.M.,	Chicago, Ill.
Francis Donaldson,	M.E.,	Baltimore, Md.
William Albert Ehlers,	M.E.,	Hernwood, Md.
Charles Enzian,	C.E.,	Weissport.
Cadwallader Evans, jr.,	M.E.,	Pittsburg.
Edward Morse Field,	E.M.,	Montclair, N.J.
John Henry Flory,	E.E.,	Ashley.
Ernesto Franco,	C.E.,	Quito, Ecuador.
Lewis Alfred Freudenberger,	E.E.,	West Bethlehem.
Josef Blackburn Freund,	E.E.,	Washington, D.C.
Cástulo Gallardo,	C.E.,	Guadalajara, Mexico.
Cástulo Martinez Gallardo,	C.E.,	Guadalajara, Mexico.
Morris Wilber Garman,	E.M.,	Nanticoke.
Frank Benjamin Gearhart,	A.C.,	Altoona.
William Mahlon Gilbert,	E.E.,	Lo Lo, Mont.
Matthew Gilmour, jr.,	M.E.,	Richmond, Va.
Thomas Mercer Girdler,	M.E.,	Jeffersonville, Ind.
Wilbur Wilson Graff,	E.M.,	Rushville, Ill.
Percy Lamar Grubb,	Clas.,	Harrisburg.
Webster Neugard Haas,	C.E.,	Hepler.
Samuel Thomas Harleman,	M.E.,	South Bethlehem.
Ellwood Scott Harrar,	E.E.,	Allentown.

	Course.	Residence.
Frederick Apple Hausman,	C.E.,	Allentown.
Samuel Parke Heitshu,	C.E.,	Lancaster.
Austin Diehl Heller,	L.S.,	Hellertown.
Webster Thomas James,	E.M.,	Chattanooga, Tenn.
Edmund Percival Jump,	M.E.,	Easton, Md.
George Maisch Kennedy,	E.E.,	Pottsville.
Farley Kimball,	M.E.,	New York City.
Louis Gustave Krause,	C.E.,	Absecon, N. J.
John Stauffer Krauss,	E.E.,	East Greenville.
Samuel Townsend Laubach,	M.E.,	Northampton.
Albert Raymond Laubenstein,	M.E.,	Ashland.
Charles Joseph McGonigle,	C.E.,	Allentown.
Johnson McVey,	A.C.,	South Bethlehem.
Albert Winfred Mans,	C.E.,	Hazleton.
Conrado Eugenio Martinez,	C.E.,	Habana, Cuba.
Luther Dwight Menough,	C.E.,	York.
Henry Jarvis Moore,	E.M.,	Gill, Mass.
Edward Thomas Murphy,	M.E.,	Brooklyn, N. Y.
Elmer Fellman Musselman,	M.E.,	Middletown.
Harvey S. Musselman,	M.E.,	Steinsburg.
John Joseph Nolan,	M.E.,	Carbondale.
Harry Edward Packer,	M.E.,	South Bethlehem.
Everett Johnson Peck,	M.E.,	Plainfield, N. J.
John Vincent Rittenhouse,	E.E.,	Plainfield, N. J.
William Perry Rogers,	M.E.,	Latrobe.
Branch Elliott Russell,	E.M.,	Portage, Wis.
James C. Ryan,	E.E.,	Harrisburg.
Albert Clinton Savidge,	E.E.,	Sunbury.
Carlos Nathaniel Scovil,	M.E.,	Copenhagen, N. Y.
John Wallace Shaeffer,	M.E.,	Fleetwood.
Myles Standish Smith,	M.E.,	Mishawaka, Ind.
Herbert Spencer Stauffer,	C.E.,	South Bethlehem.
Herman Arnold Straub,	C.E.,	Pittsburg.
Charles Meredith Strawn,	E.E.,	Quakertown.
John Fife Symington,	M.E.,	Baltimore, Md.
Richard Ferrier Taylor,	E.E.,	Bethlehem.
Edward T. Thornton,	E.M.,	Philadelphia.

	Course.	Residence.
Grandison Gridley Underhill,	C.E.,	East Aurora, N.Y.
James Strawbridge Van Alen,	E.E.,	Northumberland.
Frederick Dana Viehe,	A.C.,	Atlanta, Ga.
George William Welsh,	E.E.,	Hanover.
John Whitridge,	C.E.,	Baltimore, Md.
Edwin Benton Wilkinson,	A.C.,	Williamsport.
Henry Dalzell Wilson,	M.E.,	Pittsburg.
Thomas Wilbraham Wright,	E.M.,	Philadelphia.
Arthur Reuben Young,	C.E.,	West Bethlehem.

FRESHMAN CLASS.

	Course.	Residence.
Daniel Agnew, jr.,	C.E.,	Lancaster.
Arthur Garfield Bachman,	A.C.,	Lancaster.
Felix Bareis, jr.,	M.E.,	Cumberland, Md.
Robert Ernst Baum,	M.E.,	Bethlehem.
William Frederick Berger,	M.E.,	South Bethlehem.
Robert Montgomery Bird,	M.E.,	South Bethlehem.
Phillips Blagden,	E.M.,	New York City.
Allan Gordon Bohannon,	E.E.,	Hickory, N.C.
William Smith Brownell, jr.,	A.C.,	Newport, R.I.
William Taggart Carpenter,	M.E.,	Pittston.
Luis Cuesta,	C.E.,	Guadalajara, Mex.
John Atkinson Cunningham,	E.E.,	Henderson, Ky.
James Thomas Davies,	Sci.,	Catasauqua.
Louis De Sauque Dibert,	M.E.,	Johnstown.
Alpha Albert Diefenderfer,	A.C.,	Allentown.
James Nethermark Downey,	E.E.,	Lancaster.
Claudio Dumás,	E.E.,	Matanzas, Cuba.
Edmund M. Erb,	E.E.,	Slatington.
Carl Watson Evans,	E.E.,	Great Falls, Mont.
William L. Fleming,	E.M.,	New Castle.
Henry Le Roy Fryer,	C.E.,	Chester.
Thomas K. Reed Gardner,	C.E.,	Egg Harbor City, N.J.

	Course.	Residence.
John Thomas Gavan,	C.E.,	Scranton.
William Berger Geiser,	Sci.,	Bath.
Peter William Gleason,	M.E.,	South Bethlehem.
Felix Golian,	C.E.,	Phoenixville.
Charles Albert Gradwohl,	E.E.,	South Bethlehem.
William Thomas Griffith,	E.M.,	Kane.
Robert Franklin Gross,	E.M.,	Bethlehem.
Maximilian Showzo Hachita,	E.M.,	Sanuki, Japan.
William Rankin Hall,	M.E.,	Middletown, Del.
George Wellington Hamilton,	E.E.,	Pottsville.
Irad Hawley, jr.,	M.E.,	East Orange, N.J.
John S. Hegeman,	M.E.,	Bethlehem.
William Louis Heim,	E.E.,	Kane.
Foster Hewett,	E.M.,	Corona, Ala.
Arthur Clark Hill,	M.E.,	Willimantic, Conn.
Joseph Earl Hill,	E.E.,	Bethlehem.
Albert Cass Hutchinson,	C.E.,	Mishawaka, Ind.
Robert Jarecki,	M.E.,	Erie.
William Henry Jaxheimer,	M.E.,	Bethlehem.
Walter Scott Johns,	C.E.,	Martindale.
John Patrick Kelly,	C.E.,	Salamanca, N.Y.
Charles Edgar Kendig,	E.E.,	Baltimore, Md.
Walter Savage Landis,	M.E.,	Pottstown.
Ricardo León,	M.E.,	Chiapas, Mex.
Gay Breton Leroux,	C.E.,	Annapolis, Md.
Allen Ledyard Lindley,	E.M.,	New York City.
Frederick Farrar Lines,	E.M.,	South Bethlehem.
Robert Spear Lowry,	M.E.,	Butler.
Myron Jacob Luch,	Clas.,	Santee.
Joseph Treanor McNaier,	E.E.,	Yonkers, N. Y.
José M. Mendoza,	M.E.,	Lima, Peru.
Elmer McClellan Milheim,	E.E.,	Bloomsburg.
Clinton Laubach Mill,	M.E.,	Springtown.
Anthony J. Monaghan,	E.E.,	Shenandoah.
William Lloyd Morgan,	C.E.,	Harwood Mines.
Charles Edwin Pugh Murray,	C.E.,	Columbia.
Floyd William Parsons,	E.M.,	Grafton, W.Va.
Wilbur Hendrickson Peepels,	M.E.,	Lancaster.

	Course.	Residence.
Raymond Thomas Peppell,	M.E.,	Allentown.
Amalat Ramos,	M.E.,	Chiapas, Mex.
William Frank Roberts,	M.E.,	Freeland.
Daniel Martin Sachs, jr.,	M.E.,	Gowen.
James Cadwalader Sellers, jr.,	E.E.,	West Chester.
William Roy Shively,	M.E.,	Philadelphia.
John J. Shonk, jr.,	M.E.,	Plymouth.
Joseph Aiken Simons,	E.E.,	Charleston, S. C.
William Penn Slifer,	C.E.,	Bingen.
Paul Helsel Smith,	E.E.,	Butler.
Edmund Sewell Stevens,	C.E.,	Allentown.
Hopkin Thomas,	E.E.,	Catasauqua.
William Ernest Thomas,	E.M.,	Philadelphia.
Robert Wm. Thoroughgood,	C.E.,	Georgetown, Del.
George William Webb,	M.E.,	South Bethlehem.
James Brookes Wright,	M.E.,	S. McAlester, Ind.Ty.

SPECIAL STUDENTS.

	Course.	Residence.
David Maurice Barry,	E.M.,	Agawam, Mass.
Frederick William Benzé,	L.S.,	Erie.
Benjamin Sargent Hanna,	C.E.,	Baltimore, Md.
Mason Benedict Lawton,	C.E.,	Rome, N. Y.
Walter S. Smith,	C.E.,	Forty Fort.
Ray Wilbur,	Arch.,	South Bethlehem.

SUMMARY OF STUDENTS BY STATES.

Maine,	1
Massachusetts,	3
Connecticut,	2
Rhode Island,	1
New York,	31
New Jersey,	23
Pennsylvania,	176
Delaware,	2
Maryland,	14
District of Columbia,	6
Virginia,	4
West Virginia,	3
North Carolina,	2
South Carolina,	1
Georgia,	2
Alabama,	1
Florida,	1
Kentucky,	4
Tennessee,	3
Indiana,	3
Illinois,	4
Michigan,	2
Wisconsin,	1
Missouri,	1
Kansas,	1
Colorado,	1
South Dakota,	1
Utah,	1
Montana,	3

California,	1
Indian Territory,	1
Mexico,	9
Cuba,	5
Porto Rico,	2
Nicaragua,	1
Venezuela,	2
Brazil,	1
Ecuador,	1
Peru,	1
France,	1
Armenia,	1
Japan,	1
	325

SUMMARY OF STUDENTS BY CLASSES AND COURSES.

	Graduates.	Seniors.	Juniors.	Sophomores.	Freshmen.	Specials.	Totals.
Classical,	6	—	1	2	1	—	10
Latin-Scientific,	—	—	1	1	—	1	3
Science and Letters,	2	1	2	—	2	—	7
Civil Engineering,	4	15	22	17	15	3	76
Mechanical Eng.,	1	15	27	28	27	—	98
Mining Eng.,	5	3	15	11	10	1	45
Electrical Eng.,	2	10	10	17	18	—	57
Analytical Chem.,	1	7	8	5	3	—	24
Architecture,	—	1	3	—	—	1	5
Totals,	21	52	89	81	76	6	325

ALUMNI

OF THE

LEHIGH UNIVERSITY.

CLASS OF 1869.

*J. Haynes Hinds Corbin, A.C.

Miles Rock, C.E., Astronomer, Chief Engineer, and President of the Boundary Commission of Guatemala with Mexico, Guatemala City, Central America.

Charles Edward Ronaldson, M.E., Mechanical Engineer, 4017 Locust Street, Philadelphia, Pa.

CLASS OF 1870.

*Lehman Preston Ashmead, A.C., M.D.

Richard Brodhead, M.E., Attorney-at-Law, 32 Nassau Street, New York City.

William R. Butler, M.E., Manufacturer, Mauch Chunk, Pa.

George A. Jenkins, A.C., South Bethlehem, Pa.

William J. Kerr, A.C., M.E., Supt. Motive Power, Union Traction Co., 820 Dauphin Street, Philadelphia, Pa. Residence: 1010 South 49th Street.

*Harry E. Packer, A.C.

Henry R. Price, C.E., M.D., Practicing Physician, 485 Franklin Avenue, Brooklyn, N.Y.

Henry B. Reed, B.A., M.D., Physician (retired), Milford, Pike Co., Pa.

*William Dunlop Ronaldson, B.A., M.D.

John M. Thome, C.E., Ph.D., Director National Astronomical Observatory, Cordova, Argentine Republic, S.A.

*Russel B. Yates, C.E.

* Deceased.

CLASS OF 1871.

Jacob Neff Barr, M.E., Superintendent Motive Power, Chicago, Milwaukee & St. Paul Ry., 3028 Wells Street, Milwaukee, Wis.

Frank Laurent Clerc, C.E., Mining, Philipsburg, Pa.

Henry S. Drinker, E.M., Lawyer; General Solicitor of the Lehigh Valley Railroad Co., 26 Cortlandt Street, New York City. Vice-President East Jersey Water Co., 2 Wall Street, New York City. Residence and mailing address: Haverford, Pa.

Edward F. Fassitt, A.C., 153 East Washington Lane, Germantown, Pa.

William Hull MacCarthy, B.A., Secretary of the White Mfg. Co., Globe Iron Works, 556 West 34th Street, New York City.

Waldron Shapleigh, A.C., Chemist, Welsbach Light Company, Gloucester City, N.J. Residence; 2223 Delancey Street, Philadelphia, Pa.

*Charles G. Weaver, C.E.

CLASS OF 1872.

George Pierrepont Bland, C.E., President, Keystone Structural Co., 510 Harrison Building, Philadelphia, Pa. Residence: 3220 Woodland Avenue.

Daniel P. Bruner, C.E., Civil Engineer, Architect, and Builder, 501 W. Chelten Ave., Germantown, Philadelphia, Pa.

Henry St. Leger Coppée, C.E., U. S. Assistant Engineer, in charge of U. S. Levees in Mississippi, Greenville, Miss.

*F. R. Christian Degenhart, A.C.

Harvey S. Houskeeper, B.A., Principal of State Academy, Brookeville, Md.

*Lentz Edmund Klotz, C.E.

Oscar Moore Lance, A.C., General Manager, Spring Brook Water Supply Co., Plymouth, Pa.

Raymundo Floresta de Miranda, M.E., Division Engineer, Rio de Janeiro and Northern R. R. Address: E. F.

* Deceased.

Principe de Grao Pará, Estaçaodo Areal, Rio de Janeiro, Brazil.

James S. Polhemus, C.E., Assistant U. S. Engineer, in local charge Coos Bay Harbor Improvements, Empire, Oregon.

Henry Darcy Scudder, C.E., Lumber and Coal, 344 Perry Street, Trenton, N.J.

CLASS OF 1873.

Washington Hopkins Baker, A.C., M.D., Physician and Life Insurance Examiner, 1610 Summer Street, Philadelphia, Pa.

Robert B. Claxton, C.E., 5116 Newhall St., Germantown, or University Club, Philadelphia, Pa.

James Peyton Stuart Lawrance, M.E., Chief Engineer U.S. Navy, U.S. Gunboat "Wilmington." Permanent address: care of Navy Department, Washington, D.C.

Hildebrando Barjona de Miranda, A.C., Professor of English, Lyceo Paraence, Belém do Pará, Estades Unidos do Brazil.

Wallace McIlvaine Scudder, M.E., Publisher Newark *Evening News.* Residence: 10 Washington Place, Newark, N. J.

CLASS OF 1874.

Caspar Wistar Haines, A.M. (Haverford '72), C.E., of the firm of Silva y Haines, Engineers and Contractors, Puebla, Mexico.

William Davis Hartshorne, C.E., Superintendent Worsted Department, Arlington Mills, Lawrence, Mass. Residence: 40 Pleasant Street, Methuen, Mass.

Allen A. Herr, C.E., Civil Engineer and Real Estate Agent, 108 East King Street, Lancaster, Pa.

Thomas Merritt, C.E., Manager Mutual Life Insurance Co. of New York, 31-32-33 Canadian Bank of Commerce Building, Toronto, Can.

William Marshall Rees, C.E., First Assistant Engineer, Mississippi River Improvement, Appeal Building, Memphis, Tenn.

CLASS OF 1875.

Charles Julius Bechdolt, C.E., Superintendent Central Division P., W. & B. R. R., Media, Pa.

Antonio M. Cañadas, A.C., Chemist, Loja, Ecuador.

John F. Halbach, B.A., B.M., Attorney-at-Law, 1218–1220 Filbert Street, Philadelphia, Pa.

William Arthur Lathrop, C.E., General Superintendent Lehigh Valley Coal Co., Wilkes-Barre, Pa.

Arthur E. Meaker, C.E., Assistant Professor of Mathematics, Lehigh University. Residence: 542 North Street, Bethlehem, Pa.

Joseph Morrison, C.E., Resident Engineer for Lines west of the Mississippi River, The Wabash Railroad Co. Residence: 401 S. Clark Street, Moberly, Mo.

Francis Sebastian Pecke, C.E., Secretary, The Nebraska, Kansas & Gulf Railway Company. Residence: 138 Franklyn Place, Flushing, N.Y.

Edward H. Williams, jr., B.A. (Yale), A.C., E.M. ('76), F. G.S.A., Professor of Mining and Geology, Lehigh University. Residence: Twelfth Avenue, (West) Bethlehem, Pa.

*Carl F. Zogbaum, C.E.

CLASS OF 1876.

Frank C. Angle, C.E., Attorney-at-Law, Danville, Montour Co., Pa.

*James DeWitt Carson, C.E.

*Thomas William Frederick, M.E.

William Griffith, C.E., Mining Engineer and Coal Specialist, Coal Exchange, Scranton, Pa. Residence: 405 Susquehanna Ave., West Pittston, Pa.

C. William Macfarlane, C.E., Ph.D. (Freiberg i. B. '93). Narberth, Pa.

Robert W. Mahon, C.E., Ph.D. (Johns Hopkins), Monongahela Furnace Co., McKeesport, Pa.

J. J. de Gama Malcher, M.E., Naval Officer, Custom House, Para, Brazil.

* Deceased.

Walter Percival Rice, C.E., Civil Engineer, The Walter P. Rice Engineering Company, 545 Society for Savings Building, Cleveland, Ohio. Residence: 293 Euclid Ave.

Henry Richards, E.M., Contractor, Dover, N.J.

Lowdon W. Richards, M.E., Columbia, Pa.

Charles L. Taylor, E.M., Assistant to President, The Carnegie Co., Limited, Carnegie Building, Pittsburg, Pa.

CLASS OF 1877.

John Eagley, C.E., North Springfield, Erie Co., Pa.

Percival D. Giess, C.E., Bethlehem, Pa.

Andrew M. Glassel, C.E., Bowling Green, Va.

George M. Heller, C.E., Bridge Engineer, 853 North 20th Street, Philadelphia, Pa.

Henry Sylvester Jacoby, C.E., Associate Professor of Bridge Engineering and Graphics, Cornell University. Residence: 7 Reservoir Avenue, Ithaca, N.Y.

James Fremont Marsteller, C.E., Superintendent, Snow Shoe Division, Lehigh Valley Coal Co., Snow Shoe, Centre Co., Pa.

*Seizo Miyahara, C.E.

Charles R. Rauch, A.C., Central Hotel, Bethlehem, Pa.

Lewis Theodore Wolle, C.E., Secretary of the Cambria Mining Co., Cambria, Weston Co., Wyoming.

CLASS OF 1878.

Charles Bull, M.E., Assistant Librarian and Bursar, General Theological Seminary, Chelsea Square, New York City.

*James E. Gilbert, C.E.

William Convers Hazlett, M.E., Architect, 151 Broadway, New York City

Frank Perley Howe, B.A. (Brown), E.M., President, The North Branch Steel Co.; Vice-President, Wm. Wharton, jr., & Co., Inc. Residence: 251 South 17th Street, Philadelphia, Pa.

Nathaniel Lafon, M.E., Engineer for Jellico & Bird Eye Coal Co., Halsey, Whitley Co., Ky.

* Deceased.

Benjamin B. Nostrand, jr., M.E., Electrical Engineer, The Westinghouse Electric and Manufacturing Co.; Treasurer and Manager, The Sing Sing Electric Lighting Co.; President and Treasurer, The Peekskill Electric Light and Power Co., Peekskill, N.Y.

Milnor Peck Paret, C.E., Resident Engineer, Kansas City, Pittsburg & Gulf R.R., Lake Charles, La.

Holbrook Fitz John Porter, M.E., Sales Agent, Bethlehem Iron Co., Bethlehem, Pa.

William K. Randolph, C.E.

Robert H. Read, B.A., Counsel and Expert in Patent Cases, 44 Broad Street, New York City. Residence: East Orange, N. J.

Henry Church Wilson, C.E., Chief Clerk, U. S. Engineer Office, Room C 8, Army Building, New York City.

CLASS OF 1879.

James S. Cunningham, M.E., Superintendent and Chief Engineer, Berwind-White Coal Mining Co., Tyrone, Pa. Residence: Windber, Somerset Co., Pa.

*Joseph Hill Paddock, M.E.

Fitz William Sargent, C.E., General Agent The Sargent Co., 675 Old Colony Building, Chicago, Ill. Residence: Wilmett, Ill. (P. O. Box 273.)

Richard Hawley Tucker, C.E., Astronomer, Lick Observatory, Mt. Hamilton, Cal.

CLASS OF 1880.

Abraham Bruner, E.M., Civil Engineer, Assistant Engineer, Norfolk & Western R.R., Crewe, Nottoway Co., Va.

Murray Morris Duncan, A.C., E.M. ('80), Agent Cleveland-Cliffs Iron Company, Ishpeming, Michigan.

Thomas Hughlett Hardcastle, B.A., M.A. ('82), LL.B., Attorney-at-Law, 601 Boston Building, Denver, Col. Residence: 950 Pearl Street.

John Tinsley Jeter, E.M., Superintendent of the Keystone Coal Co., Wilkes-Barre, Pa. Residence: 222 S. Franklin Street.

* Deceased.

Charles Francis King, A.C.

George Ernest Potter, C.E, Assistant Engineer, New York, Chicago & St. Louis R. R., 151 Wayne Street, Fort Wayne, Ind.

Frederick Putnam Spalding, C.E., Contracting Engineer, Bethlehem, Pa.

Leonard Blakeslee Treharne, B.A., Editorial Department, *New York Times*, New York City.

Benjamin Russell Van Kirk, M.E., Locomotive Designer, Baldwin Locomotive Works, 2105 Green Street, Philadelphia, Pa.

*Frederick Copeland Wooten, M.E.

CLASS OF 1881.

William Simon Cranz, A.C., Purchasing and Development of Mining Property, Nogales, Arizona.

Alexander Patrick Crilly, B.A., Allentown, Pa.

Thomas Morgan Eynon, M.E., General Manager, The Eynon-Evans Mfg. Co., 15th and Clearfield Streets, Philadelphia, Pa. Residence: 3102 North 15th Street.

Charles Weed Gray, A.C., with Central of Georgia Ry., Chicago, Ill.

Benjamin Franklin Haldeman, E.M., Superintendent, Bessemer Department, Cambria Steel Co., Johnstown, Pa. Residence: Fayette Street, Westmont, Johnstown.

Lewis Stockton, B.A., Counselor-at-Law, Erie Bank Building, Cor. Niagara and Main Streets, Buffalo, N. Y. Residence: Cor. North and Franklin Streets.

CLASS OF 1882.

Louis Oscar Emmerich, E.M., Mining Engineer, Hazleton, Pa.

Charles Comstock Hopkins, B.S. (Sci.), C.E. ('84), member of firm of The Stanwix Engineering Co., Hydraulic and Sanitary Engineers, Rome, N.Y.

*Deceased.

Elmer Henry Lawall, C.E., Mining and Consulting Engineer, Vice-President Colliery Engineer Co., Scranton, Pa. Residence: 133 S. Franklin St., Wilkes-Barre, Pa.

Robert Thomas Morrow, C.E., Assistant Engineer, Elmira and Canandaigua Divisions, N. C. Ry., Elmira, N. Y. Residence: 702 Park Place.

Eugene Ricksecker, C.E., Civil Engineer, U. S. Assistant Engineer in local charge of fortification work, Marrowstone Point, Seattle, Washington.

John Dougherty Ruff, E.M., 328 South 21st Street, Philadelphia, Pa.

*Samuel Brenton Sickler, C.E.

Martin Wittmer, E.M., Superintendent Wittmer Brick Co., Limited, Glen Shaw, Allegheny Co., Pa.

CLASS OF 1883.

*Enos Kellar Bachman, E.M.

Walter Briggs, B.A., Attorney-at-Law, Board of Trade Building, Scranton, Pa. Residence: 1505 Adams Ave.

Henry Augustus Butler, B.S. (Sci.), Secretary and Treasurer, Carbon Iron and Steel Co., Limited, Mauch Chunk, Pa.

Hedley Vicars Cooke, B.A., LL.M. (Columbian University), Attorney-at-Law, 77-79 Trinity Building, New York City. Residence: 293 Park Avenue, Orange, N.J.

Francis Joseph Crilly, B.A., M.A. ('89), Special Deputy Collector of the Port, Custom House, Philadelphia. Residence: 1926 Spring Garden Street.

Francis Wharton Dalrymple, C.E., City Engineer, 131 Main Street, Hornellsville, N.Y.

Timothy James Donahoe, A.C., Benson Mines, N. Y.

George Francis Duck, E.M., Wholesale Coal Dealer, Room 9, 1 Broadway, New York City. Residence: 41 Madison Street, Brooklyn, N. Y.

Alfred Edmond Forstall, M.E., Secretary and Treasurer, American Gas Light Association; Secretary, Board of Trustees for Educational Work of the Association; Con-

*Deceased.

sulting Gas Engineer. Residence: 60 Christopher Street, Montclair, N.J.

Nathaniel Oliver Goldsmith, M.E., Principal Engineer, The Weir Frog Co.; Vice-President, The Wefugo Co.; Treasurer, The American Coke Drawer Co., Cincinnati, Ohio. Residence: Glendale, Hamilton Co., O.

William Theodore Goodnow, C.E., General Manager Cayuta Wheel and Foundry Co., and The Sayre Land and Water Co., Sayre, Pa.

John Daniel Hoffman, B.A., M.A. ('89), Counselor-at-Law, 17 Broad Street, Bethlehem, Pa. Residence: 30 N. Main Street.

George Gowen Hood, C.E., Civil Engineer, Mount Airy, Philadelphia, Pa.

Garrett Linderman Hoppes, C.E., Eagle Hotel, Bethlehem, Pa.

Julian de Bruyn Kops, B.E. (University of Georgia), C.E., Assistant City Engineer, Savannah, Ga.

Preston Albert Lambert, B.A., M.A. ('91), Assistant Professor of Mathematics, Lehigh University, South Bethlehem, Pa.

Edwin Francis Miller, M.E., with R. D. Wood & Co., Camden, N.J.

Rev. Wilson Franklin More, B.A., M.A. ('91), Pastor Salem Reformed Church, Catasauqua, Pa.

Nelson Morrow, M.E., Manager of the Deep Rock Mineral Springs, Oswego, N.Y. Residence: 235 W. First St.

Thomas Nicholson, M.E., with the Johnstown R.R. Frog and Switch Co., Chester, Pa.

George Spencer Patterson, E.M., Mining and Civil Engineer, 400 Opera House Building, Terre Haute, Ind.

Rembrandt Richard Peale, B.S. (Sci.), Secretary and Treasurer, Bloomington Mining Co., 411–413 Walnut Street, Philadelphia, Pa.

Henry Allebach Porterfield, E.M., President and General Manager, The Dexter Spring and Gear Co., Inc., Pittsburg, Pa. Residence: 319 S. Hiland Avenue, E.E.

Francis Henry Purnell, C.E., E.M. ('86), Clerk of the Circuit Court, Worcester Co., Snow Hill, Md.

Jesse Wilford Reno, E.M., Rapid Transit Tunnel for New York City; The Reno Inclined Elevator Co.; Mining Expert, Mills Building, New York City.

Charles Loomis Rogers, M.E., General Manager, Milton Car Works, Milton, Pa.

John Ruddle, M.E., General Supervisor, Canal Department, The Lehigh Coal and Navigation Co., Mauch Chunk, Pa.

Charles Henry Stinson, B.S. (Sci.), Attorney-at-Law, Norristown, Pa.

*Robert Stinson, B.S. (Sci.).

CLASS OF 1884.

Robert Grier Cooke, B.A., Journalist, with Collier's Weekly, 521 West 13th Street, New York City. Residence: 43 West 35th Street.

Henry Bowman Douglas, B.M., E.M. ('85), Consulting Mining Engineer, Vintondale, Cambria Co., Pa.

William Banks Foote, B.M., E.M. ('86), Etiwanda, San Bernardino Co., Cal.

Harry Tallman Harper, C.E., Assistant Engineer, Florence & Cripple Creek Railroad, Florence, Col.

Harry Hurd Hillegass, C.E., Civil Engineer, Reading, Pa.

Edwin Franklin Hofford, C.E., Lehighton, Pa.

John Andrew Jardine, B.M., E.M. ('85), with Pilling & Crane, Girard Building, Philadelphia, Pa. Mailing address: Kenvil, Morris Co., N. J.

James Warner Kellogg, M.E., Manager of Marine Sales, General Electric Co., Schenectady, N.Y. Residence: 10 Front Street.

David Garrett Kerr, B.M., Superintendent of Blast Furnace, Edgar Thomson Works, Carnegie Steel Co., Lim., Braddock, Pa. Residence: 17 Kirkpatrick Ave.

Frederick Bowman Langston, C.E., Architect, 1239 Bedford Avenue, Brooklyn, N.Y.

William Langston, C.E., with Dean & Westbrook, Bridge Engineers and Contractors, 136 Liberty St., New York City.

*Deceased.

Robert Packer Linderman, Ph.B., President of the Bethlehem Iron Company; President of the Lehigh Valley National Bank. Residence: South Bethlehem, Pa.

Joseph Franklin Merkle, C.E., M.D. (Univ. of Pa. '94), Physician and Surgeon, Llewellyn, Pa.

Harry Krider Myers, C.E., with Baldwin Locomotive Works, Philadelphia, Pa. Residence: 3653 North 15th Street.

Albino Rosendo Nuncio, M.E., Chief of the Patent Office, Department of Public Promotion (Secretaria de Fomento), City of Mexico, Mexico.

James Ward Packard, M.E., President, The Packard Electric Co., Manufacturers, Warren, O.

Alfred Scull Reeves, B.M., E.M. ('85), of the firm of Paul S. Reeves & Son, Manufacturers of Phosphor Bronze, Brass, Babbitt Metals, etc., 1415-1425 Catharine Street, Philadelphia, Pa. Residence: 21st Street and Delancey Place.

Barry Searle, A.C., Superintendent Deep Crown Gold Mine, Johannesburg, South African Republic. Permanent address: care of R. S. Searle, Montrose, Pa.

Lewis Buckley Semple, B.A., M.A. ('91), Ph.D. (Princeton), Instructor in English, Lehigh University.

Augustus Parker Smith, M.E., LL.B. (Georgetown Univ.), Counsel in Patent Cases, 45 Broadway, New York City. Residence: Hotel Lincoln, 52d Street and Broadway.

Murray Stewart, M.E., Motive Power Department, Philadelphia, Wilmington & Baltimore R. R. Co., Wilmington, Del.

Richard Washington Walker, C.E., Glen Moore, Pa.

James Angus Watson, C.E., Patent Lawyer, 931 F Street, N.W., Washington, D. C. Residence: 1454 Howard Avenue.

CLASS OF 1885.

Warren Howard Allen, A.C., Clerk, Farmers' National Bank, Athens, Pa.

Harrison Link Auchmuty, C.E., Assistant Chief Engineer, H. C. Frick Coke Co., Loucks Ave., Scottdale, Pa.

*Theodore Weld Birney, C.E.

Harry Luther Bowman, B.M., care of Y. M. C. A., Harrisburg, Pa.

William Harvey Cooke, B.A., M.D., 10 N. Munn Avenue, East Orange, N. J.

William Noble Edson, C.E., of the firm of Edson Brothers, General Contractors, Phelps, N.Y.

*John Roberts Engelbert, C.E.

Felix Freyhold, C.E., Draftsman, Bureau of Yards and Docks, Room 166, Navy Department, Washington, D.C. Residence: 236 First Street, S.E.

Irving Andrew Heikes, B.M., E.M. ('86), Superintendent of Schools, Plymouth, Pa.

David Kirk Nicholson, M.E., with the Carnegie Steel Co., Limited, Braddock, Pa.

*Fayette Brown Petersen, C.E.

John Bertsch Price, C.E., Cashier, First National Bank, Hazleton, Pa.

Harry William Rowley, M.E., Chief Draftsman, The Dickson Manufacturing Co., Scranton, Pa.

*Elliot Otis Smith, C.E.

Clarence Moncure Tolman, M.E., Mechanical and Electrical Engineer, with Edward G. Stoiber, Silver Lake Mines, Silverton, Col.

John R. Wagner, M.E., Superintendent of Motive Power and Machinery for The Delaware, Susquehanna & Schuylkill R. R., The Cross Creek Coal Co., and The Coxe Iron Mfg. Co. Residence: Drifton, Luzerne Co., Pa.

James Hollis Wells, C.E., Civil Engineer, with Clinton & Russel, Architects, 32 Nassau Street, New York City.

Cabell Whitehead, B. M., M. S. (Columbian Univ.), Chemist, Assayer to the Bureau of the Mint, Treasury Department, Washington, D.C. Residence: 1102 New Hampshire Avenue.

* Deceased.

CLASS OF 1886.

George Rodney Booth, Ph.B., Attorney-at-Law, Cor. Brodhead Ave. and Fourth St., South Bethlehem, Pa. Residence: 410 Market St., Bethlehem, Pa.

Richard Singmaster Breinig, B.S., E.M. ('89), Engineer Department, Kansas Division, Union Pacific Ry., 12th and Liberty Streets, Kansas City, Mo. Residence: 1600 Park Avenue.

John Henry Brown, C.E., Assistant Engineer, Sewerage Department, City Hall, Chicago, Ill. Residence: 757 Warren Street.

Charles Ellsworth Clapp, Ph.B., Attorney-at-Law, 841 New York Life Building, Omaha, Neb.

George Henry Cobb, M.E., Chief Engineer, New York Transit Co. Residence: 254 Pennington Avenue, Passaic, N.J.

William Henry Dean, B.M., E.M. ('86), A.C. ('86), Analytical Chemist, and Professor of Chemistry, Harry Hillman Academy, 89 West River Street, Wilkes-Barre, Pa.

Frederick William Fink, C.E., of the firm of Gibson & Fink, Civil and Mining Engineers, U. S. Deputy Mineral Surveyors, 303 Carr Avenue, Cripple Creek, Col.

Robert Caldwell Gotwald, C.E., Architect, Springfield, O.

Lewis John Henry Grossart, C.E., Civil Engineer, with the Atlas Cement Co., Northampton, Pa. Residence: 513 Allen Street, Allentown.

Max S. Hanauer, A.C., Manager Union Assay Office, 152 S. W. Temple St., Salt Lake City, Utah. Residence: 1111 E. First South Street.

Solomon Jacob Harwi, C.E., Assistant Engineer, Marine Department, The Babcock & Wilcox Co., New York City. Residence: 38 West 33d Street, Bayonne, N. J.

Simeon Cole Hazelton, B.M., E.M. ('87), Assistant Superintendent, Germania Lead Works, Murray, Utah.

Mark Antony De Wolfe Howe, jr., B.A., A.B. and A.M. (Harvard), Bristol, R.I.

Charles Alexander Junken, C.E., Computer on Gun Construction, Ordnance Office, War Department, Washington, D.C. Residence: 435 New Jersey Avenue, S. E.

Guadalupe Lopez de Lara, M.E., of the firm of Mora y Lopez de Lara, Constructores y Contratistas, Calle de Sn. Francisco No. 17½, Guadalajara, Jalisco, Mexico.

Charles Augustus Luckenbach, B.M., Purchasing Agent for The Los Angeles Lighting Co. and the Los Angeles Electric Co., 457 Broadway, Los Angeles, Cal. Residence: 1266 Ionia Street.

William Anthony Lydon, B.M., E.M. ('87), President Lydon & Drews Co., Engineers and Contractors, 1441 Unity Building, 79 Dearborn St., Chicago, Ill. Residence: 2952 Indiana Avenue.

Paul Douglass Millholland, C.E., with J. H. Sternbergh & Son, (Bolts, Nuts, etc.), Reading, Pa. Residence: 415 Spring Street.

Henry Gerber Reist, M.E., Mechanical and Electrical Engineer, with General Electric Co., Schenectady, N.Y. Residence: 5 South Church Street.

Joseph William Richards, A.C., M.S. ('91), Ph.D. ('93), Assistant Professor of Metallurgy, Lehigh University. Residence: 117 Market Street, Bethlehem, Pa.

George Mann Richardson, A.C., Ph.D. (Johns Hopkins), Professor of Organic Chemistry, Leland Stanford, Jr., University, Stanford University, Cal.

*Augustus Stoughton Ross, M.E.

*George Arthur Ruddle, Ph.B.

William Heysham Sayre, jr, M.E., Manager International Contracting Co., 95 Broad Street, New York City. Residence: South Bethlehem, Pa.

John Selmar Siebert, C.E., Architect, Cumberland, Md.

John Henry Spengler, C.E., Assistant City Engineer, Room 325 City Hall, Chicago, Ill. Residence: 18 Crilly Place.

Edwin Stanton Stackhouse, B.M., E.M. ('87), General Business, Shickshinny, Pa.

*Deceased.

Theodore Stevens, B.M., E.M. ('87), Electrical Engineer, British Thomson-Houston Co., Limited, London. Residence: Lorne Villa, Marlborough Road, S. Woodford, Essex, England.

Harry Eugene Stout, B.S. (in Mining and Metallurgy), Audenried, Pa.

*Joseph Kiddoo Surls, B.M.

Rev. William Patterson Taylor, B.A., Assistant Minister, St. Peter's Church, Morristown, N. J. Residence: 11 DeHart Street.

Harry Toulmin, Ph.B., M.D., Assistant Medical Director, Northwest Mutual Life Insurance Co., Milwaukee, Wis. Residence: 69 Prospect Avenue.

Priestly Toulmin, B.M., E.M. ('87), Chief Engineer and Superintendent of Mines, Sloss Iron and Steel Company, Brookside, Ala.

Curtis Hussey Veeder, M.E., President Veeder Manufacturing Co., Hartford, Conn. Residence: 40 Willard Street.

CLASS OF 1887.

Frank Fielding Amsden, B.S., E.M. ('89), Superintendent Buena Vista Furnace, Buena Vista, Md.

Robert Webb Barrell, B.M., E.M. ('88), Mining Engineer, Canadian Gold Fields, Ltd., Deloro, Ontario, Canada.

Alexander Bonnot, C.E., Poole Street, Norfolk, Va.

Charles Austin Buck, A.C., Chief Chemist, Bethlehem Iron Co., South Bethlehem, Pa. Residence: 521 Locust Street, South Bethlehem.

Julian Carter Buckner, M.E., 1009 McCulloch Street, Baltimore, Md.

Benjamin Amos Cunningham, C.E., Division Engineer, L.V.R.R., Sayre, Pa.

Eugene Diven, M.E., of the firm of Diven & Diven, Attorneys and Counselors-at-Law, 212 E. Water Street, Elmira, N. Y. Residence: 957 Lake Street.

Alfred Doolittle, B.A., Director of the Observatory and Instructor in Mathematics in the Catholic University, Washington, D. C. Residence: 48 M Street, N. W.

*Deceased.

Francis Rouad Dravo, M.E., of F. R. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg. Residence: Edgeworth, Sewickley P.O., Pa.

Milton Henry Fehnel, B.S. (Sci.), A.C. ('89), Assistant Chemist at the Spreckels Refinery of the American Sugar Refining Co., Philadelphia, Pa. Residence: 265 South 9th Street.

Rev. Harvey Sheafe Fisher, B.A., B.D. (General Theological Seminary), Rector of St. John's Parish, Norristown, Pa.

Kenneth Frazier, B.A., Artist, 41 Washington Square, New York City. Residence: 58 East 78th Street.

*Henry Stevens Haines, M.E.

John Benjamin Hittell, C.E., Assistant Engineer, Bureau of Streets, 217 City Hall, Chicago, Ill. Residence: 1746 Wrightwood Avenue.

John Myers Howard, M.E., Forge Superintendent, Latrobe Steel Company, Latrobe, Pa.

Charles Colcock Jones, B.S. (in Mining and Metallurgy), Owner and Manager, Glen Comyn Gold Mines, Sautee, White Co., Ga.

William Frederic Kiesel, jr., M.E., Chief Draftsman, P. R. R., Altoona, Pa. Residence: 2320 Broad Street.

James Wesson Kittrell, C.E., of the Stanwix Engineering Co., Hydraulic and Sanitary Engineers, Rome, N.Y.

Frederick Hayes Knorr, A.C., Traveling Auditor, Union Ice Co. of California. Residence: Los Angeles, Cal.

*Samuel Davis Langdon, M.E.

John Walter Ledoux, C.E., M. Am. Soc. C.E., Chief Engineer, The American Pipe Mfg. Co., 112 North Broad Street, Philadelphia, Pa. Residence: Swarthmore, Pa.

Garrett Brodhead Linderman, Ph.B., Coal Operator, South Bethlehem, Pa.

Harry Smuller Meily, C.E., Assistant Supervisor, P.R.R., Spruce Creek, Pa.

James Alexander Morrow, C.E., Hydraulic Engineer, American Water Works and Guarantee Co., Limited, Lewis Block, Pittsburg, Pa.

*Deceased.

Henry Benjamin Charles Nitze, B.S., E.M. ('88), Consulting Mining Engineer, care of Robt. Garrett & Sons, 11 South Street, Baltimore, Md. Residence: Roland Park, Baltimore, Md.

George Francis Pettinos, M.E., of the firm of Pettinos Brothers, Miners of Graphite, L. V. National Bank Building, Bethlehem, Pa. Residence: 345 Market Street.

Robert Henry Phillips, C.E., Manager, Washington, Arlington & Falls Church Ry. Co., Washington, D. C. Residence: 3342 M Street.

Rufus King Polk, B.S., E.M. ('88), Member of Congress; General Manager North Branch Steel Co., Danville, Pa. Residence: 6 Walnut Street.

Charles Pope Pollak, C.E., Traveling Salesman, Fairbanks, Morse & Co., Chicago, Ill. Permanent address: 1129 N. Grand Avenue, St. Louis, Mo.

Mason Delano Pratt, C.E., Street Railway Engineer, Pennsylvania Steel Co., Steelton, Pa.

Evan Turner Reisler, C.E., Roadmaster, New York, Lake Erie & Western R. R., Port Jervis, N.Y. Residence: 50 E. Main Street.

George Thomas Richards, C.E., Engineer for Drake and Stratton Co., Conestoga Building, Pittsburg, Pa. Residence: 5815 Hays Street.

*John Warwick Scull, M.E.

Frank Stuart Smith, A.C., Manager Sawyer-Man Electric Co., Allegheny, Pa.

Elmer Ellis Snyder, C.E., Roadmaster, Louisville, Cincinnati, and Lexington Division, Louisville & Nashville R. R., LaGrange, Ky.

Harry Harkness Stoek, B.S., E.M. ('88), Editor *Mines and Minerals*, Scranton, Pa. Residence: 809 Quincy Avenue.

*Otway Owen Terrell, M.E.

Edward Power Van Kirk, B.M., Electrical Engineer, Elizabeth, Pa.

August Julius Wiechardt, M.E., Professor of Mechanic Arts, Agricultural College, Miss.

*Deceased.

Henry August Julius Wilkens, B.S., E.M. ('88), Mining Engineer, 52 Wall Street, New York City.

Frank Williams, B.S., E.M. ('88), Manager Basic Brick Co., and Fayette Manufacturing Co., 511 Main Street, Johnstown, Pa.

Nissley Joseph Witmer, C.E., Draftsman, Dept. of Public Works of Philadelphia. Address: 4534 Frankford Avenue, Philadelphia, Pa.

*Hampton Woods, B.S. (Sci.), B.M. ('88), E.M. ('89).

George Frederic Yost, M.E., L. V. Coal Co., Wilkes-Barre, Pa.

Charles F. Zimmele, Ph.B., Principal Bradley School, 205 Ninth Street, S.W., Washington, D. C.

CLASS OF 1888.

Charles Lambert Addison, M.E., General Roadmaster, Long Island Railroad. Residence: Hempstead, N.Y.

George Reade Baldwin, M.E., Engineer, with F. R. Dravo & Co., 812 Lewis Block, Pittsburg, Pa.

Charles Lincoln Banks, B.S. (Sci.), M.D., Physician and Surgeon, 254 State Street, Bridgeport, Conn.

Edmund A. Bates, C.E., Draftsman, King Bridge Co., Cleveland, O. Residence: 231 Kennard Street.

William Donaldson Beatty, C.E., Assistant Engineer, Philadelphia & Reading R.R. Address: Chief Engineer's Office, Reading Terminal, Philadelphia, Pa.

Hubert Alexander Bonzano, C.E., Civil Engineer, 331 South 18th Street, Philadelphia.

William Bradford, C.E., Civil Engineer, 75 Fidelity Building, Pittsburg, Pa. Residence: 142 S. Negley Avenue.

Adolph Theodore Bruegel, M.E., M.M.E. (Cornell '96), Professor of Machine Design and Mechanics, Pratt Institute, Brooklyn, N. Y. Residence: 201 Greene Avenue.

Otto Cornelius Burkhart, B.S., E.M. ('89), C.E. ('92), The Pennsylvania Steel Co., P. O. Box 694, Steelton, Pa.

*Deceased.

Charles Noble Butler, C.E., Attorney-at-Law, Patent, Trade-Mark, and Copyright Cases, 1001 Chestnut St., Philadelphia, Pa.

Morton Lewis Byers, C.E., Engineer Maintenance of Way Department, Chicago Division P. C. C. & St. L. R. R., Logansport, Ind.

John Jesse Clark, M.E., Assistant Manager, The International Correspondence Schools, and Editor of *Home Study Magazine*, P. O. Box 534, Scranton, Pa. Residence: 1210 Mulberry Street.

George Philip Connard, C.E., Engineer in charge of drafting, with Elmira Bridge Co., Lim., Box 63, Elmira, N.Y. Residence: 342 East Church Street.

Reuben Daniels, C.E., Civil Engineer, Pittsburg Plate Glass Co., Ford City, Pa.

George Herschel Davis, C.E., Assistant Engineer, Vermont Marble Co., Proctor, Vt.

William Schaff Davis, C.E., Civil Engineer and Surveyor, of the firm of Davis Bros., 519 Court Street, Reading, Pa. Residence: 49 N. Fourth St.

Philip Hoffecker DeWitt, C.E., Chief Engineer, 11 Pine Street, New York City.

Manuel Victor Domenech, C.E., City Engineer and Architect, Ponce, Porto Rico, West Indies.

George Patterson Dravo, M.E., Purchasing Agent for the Nordberg Mfg. Co., Builders of Corliss engines, high duty pumping engines, etc., Milwaukee, Wis. Residence: 374 Ninth Ave.

Charles Wesley Focht, C.E., 15 N. Centre Street, Pottsville, Pa.

George Steinman Franklin, M.E., with G. M. Steinman & Co., Hardware, 26 and 28 W. King Street, Lancaster, Pa. Residence: 337 West Chestnut St.

Samuel Wilson Frescoln, C.E., Civil Engineer and Contractor, Reading, Pa.

Louis Prevost Gaston, B.S. (in Mining and Metallurgy), C.E.('89), Somerville, N.J.

William Gates, jr., C.E., Assistant Engineer, H. C. Frick Coke Co., Scottdale, Pa.

*James Bolan Glover, jr., M.E.

Hughlett Hardcastle, M.E., M.D. (Univ. Md. '95), First Assistant Resident Physician, University Hospital, Lombard and Green Streets, Baltimore, Md. Permanent address: Easton, Md.

George Augustus Hart, M.E., Bethlehem Iron Co., South Bethlehem, Pa. Residence: 320 Packer Avenue.

Robert Browne Honeyman, B.S. (in Mining and Metallurgy), of the firm of Shiland & Honeyman, Attorneys-at-Law, 71 Broadway, New York City. Residence: 36 Montgomery Place, Brooklyn.

Sterry Henry Jencks, C.E., Civil Engineer, Berwind-White Coal Mining Co., Windber, Somerset Co., Pa.

Alfred Eli Lewis, jr., B.S., E.M. ('89), 1510 Chestnut St., Philadelphia, Pa.

Howard Hale McClintic, C.E., Assistant General Manager, Shiffler Bridge Company, 48th Street and A. V. R.R., Pittsburg, Pa. Residence: 108 Fairmount Ave.

Walter Ashfield McFarland, M.E., Superintendent, Water Department of the District of Columbia, District Building, Washington, D.C.

Howard Leoser McIlvain, A.C., Reading, Pa.

James Struthers Mack, C.E., Mining Engineer for Hempfield, Greensburg, and Carbon Coal Companies, Greensburg, Pa.

Charles Donnell Marshall, C.E., Secretary Shiffler Bridge Company, 48th Street and A. V. R. R., Pittsburg, Pa. Residence: 226 Fairmount Ave.

Charles Henry Miller, C.E., U. S. Surveyor, U. S. Engineer's Office, Equitable Building, Memphis, Tenn. Address: P. O. Box 204.

George Philips Miller, B.A. and M.A. (Bucknell), C.E., County Clerk and Recorder, Taos, New Mexico.

*John Hoff Millholland, C.E.

Harlan Sherman Miner, A.C., Assistant Chemist for the Welsbach Light Co., Gloucester City, N.J. Residence: 10 N. Broadway.

*Deceased.

Harry Semple Morrow, M.E., Latrobe Steel Co., Latrobe, Pa. Address: 732 Hill St., (Station D), Pittsburg, Pa.

Daniel Livermore Mott, C.E., Civil Engineer, 68 Arcade Building, Utica, N.Y. Residence: 140 Park Avenue.

William Lynville Neill, B.S. (Lat. Sci.), The New Domain Oil & Gas Co., Inc., Prestonsburg, Floyd Co., Ky.

Howard Seger Neiman, A.C., Manager Technical Department, Wm. J. Matheson & Co., Limited, 182-184 Front Street, New York City.

*Harry Palmer, C.E.

Charles Jeremiah Parker, C.E., Division Engineer, N. Y. C. & H. R. R. R., Watertown, N. Y. Residence: 64 Washington Street.

Robert Swain Perry, A.C., General Manager, Southern Bauxite Mining and Manuf'g Co., Cave Spring, Ga.

Francis William Birchall Pile, B.S., E.M. ('88), 50 Church Street, Bethlehem, Pa.

Albert George Rau, B.S. (Sci.), Superintendent Moravian Parochial School, 63 Broad Street, Bethlehem, Pa.

Clarence Elmer Raynor, C.E., Manorville, Long Island, N.Y.

William Pemberton Richards, C.E., Assistant Engineer, District Offices, Washington, D. C. Residence: 309 Elm Street.

Osmond Rickert, C.E., Division Superintendent, L.V. Coal Co., Lost Creek, Schuylkill Co., Pa.

William Richard Sattler, M.E., Contracting Engineer, 26 Cortlandt St., New York City. Residence: 609 N. Broad St., Elizabeth, N.J.

Eugene Hicks Shipman, C.E., Civil Engineer, American Pipe Mfg. Co., 112 N. Broad Street, Philadelphia, Pa. Residence: 721 Cherokee Street, South Bethlehem, Pa.

William Alonzo Stevenson, M.E., Waverly, N.Y.

Wyndham Harvey Stokes, B.S., E.M. ('89), .L. (Washington and Lee University '96), Attorney- c-Law, Welch, McDowell Co., W.Va.

Wilmer Marshall Webb, M.E., with H. T. Paiste Co., 3101 Ludlow Street, Philadelphia, Pa.

* Deceased.

Harvey Musser Wetzel, C.E., Resident Engineer, Santiago Division, Ferro Carril Central Dominicana, Puerto Plata, Republic of Dominica, West Indies. Residence: Guanabano, R.D.

Winter Lincoln Wilson, C.E., Instructor in Civil Engineering, Lehigh University, South Bethlehem, Pa.

Edward Benjamin Wiseman, C.E., Supervisor, Northern Central Ry., Shamokin, Pa.

Shuntaro Yamaguchi, C.E., (and Imperial University of Tokio '72), Railway Department, Mitsui & Co., Tokio, Japan. Residence: 2 Fuzimaye Cho, Komagome, Tokio.

Luther Reese Zollinger, C.E., Assistant Supervisor P. R.R., Spruce Creek, Pa.

CLASS OF 1889.

James Willoughby Anderson, B.S., E.M. ('90), Examiner, U. S. Patent Office, Washington, D. C.

*Pearce Atkinson, M.E.

Gustav Ayres, M.E., U. S. Patent Office. Address: 1311 New Hampshire Ave., Washington, D. C.

Ralph Putnam Barnard, C.E., LL.M., Accountant, Equitable Coöperative Building Association, 1003 F St., N.W., Washington, D. C. Residence: 1011 O Street, N. W.

Albert Harlan Bates, M.E., LL.B. (Ohio State Univ.), Patent Lawyer, 1028 Society for Savings Building, Cleveland, O. Residence: 764 N. Logan Avenue.

Samuel Erwin Berger, B.A., M.A. ('93), Assistant Professor of Latin and Greek, Central High School, Philadelphia, Pa. Residence: 1027 Mt. Vernon Street.

Charles Hudson Boynton, B.S. (Lat. Sci.), Night Manager, The Associated Press, Washington, D.C. Residence: The Magnolia.

Joseph Leander Budd, A.C., of the firm of Budd & Kite, Jewelers, 22 N. Thirteenth Street, Philadelphia, Pa.

Rev. Edgar Campbell, B.A., Rector St. Peter's Church, Phœnixville, Pa.

* Deceased.

Francis Joseph Carman, A.C., Producer of Petroleum, Bothwell, Ontario, Canada.

Herbert MacKenzie Carson, M.E., Assistant Engineer of Motive Power, Pennsylvania Railroad, Altoona, Pa.

Holden William Chester, C.E., Shamokin, Pa.

William Corbin, B.S. (in Mining and Metallurgy), Druggist, Gillette, Colo.

Justice Cox Cornelius, C.E., with Wm. Wharton, Jr., & Co., Inc., 25th St. and Washington Avenue, Philadelphia, Pa. Residence: 405 Wister St., Germantown.

William Albert Cornelius, M.E., Superintendent of 33″ Cog, 33″, 23″, and 10″ Structural Mills, Homestead Steel Works of The Carnegie Steel Co., Munhall, Pa. Residence: Corner Neville and Fifth Avenue, Pittsburg, Pa.

Charles Herbert Deans, C.E., Vice-President of Sooysmith & Co., President Engineering Contract Co., Mills Building, New York City. Residence: 804 St. Nicholas Ave.

Charles Estell Dickerson, jr., B.S. (Sci.), Vice-President, Mount Hermon School, in charge of department of Physics and Chemistry, Mount Hermon, Mass.

Emil Diebitsch, C.E., Superintendent for John Peirce, Contractor for Public Buildings, 18 Oak Street, Buffalo, N. Y. Residence: 436 Virginia Street.

John Webster Dougherty, B.S. (in Mining and Metallurgy), Superintendent, Blast Furnace Department, Pennsylvania Steel Co., Steelton, Pa.

Ralph Marshall Dravo, B.S. (in Mining and Metallurgy), with F. R. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg, Pa. Residence: Edgeworth, Sewickley P. O., Pa.

Ernest Hipolite Du Vivier, A.C., Mercantile, 22 Warren Street, New York City.

*William Dolloway Farwell, B.A.

Henry William Frauenthal, A.C., M.D., Physician, 214 East 50th Street, New York City.

Arthur Hugh Frazier, B.A., University Club, San Francisco, Cal.

*Deceased.

Frederick Louis Grammer, B.S., E.M. ('90), Superintendent of Furnaces, Lackawanna Iron and Steel Co., Lebanon and Cornwall. Address: Cornwall, Pa.

George Wentz Harris, B.S. (in Mining and Metallurgy), Civil and Mining Engineer, 92-94 Liberty Street, New York City. Residence: 67 Elm Street, Montclair, N.J.

Lightner Henderson, C.E., of the firm of Purdy & Henderson, Civil Engineers, 1553 Monadnock Building, Chicago, Ill., and 78 Fifth Avenue, New York City.

Conrad Egbert Hesse, B.S. (in Mining and Metallurgy), 508 A Street, S. E., Washington, D.C.

Clarence Walter Hudson, C.E., Assistant Engineer, Phœnix Bridge Company, Phœnixville, Pa.

Archibald Johnston, M.E., Superintendent Armor Plate Department, The Bethlehem Iron Co. Residence: 120 Church Street, Bethlehem, Pa.

John Stower Kellogg, jr., A.C., Night Superintendent, Illinois Steel Co., South Chicago, Ill.

John Martin Sharpless Kerlin, M.E., 3007 York Street, Philadelphia, Pa.

Sylvanus Elmer Lambert, B.A., M.A. ('91), of the firm of Lambert & Martin, Attorneys and Counselors-at-Law, 1010 Ashland Block, Chicago, Ill.

John Joseph Lincoln, C.E., Chief Engineer and Superintendent Crozer Land Association, Elkhorn, W. Va.

John Lockett, M.E., Engineer in employ of West India Improvement Co. Permanent address: Bog Walk P. O., Jamaica, W.I.

Arthur Long, A.C., Merchant, Scranton, Pa.

John Joseph Martin, C.E., Consulting Engineer, 215 West 125th Street, New York City.

*Charles Henry Miller, A.C.

Charles Williams Moffett, M.E., Mechanical Manager, National Water Tube Boiler Co., New Brunswick, N.J.

Richard Henry Morris, jr., B.S. (in Mining and Metallurgy), Bristol, Pa.

William Ellis Morris, A.C., 19th and E Streets, Portland, Oregon.

John Thomas Morrow, M.E., Superintendent, Electrolytic Copper Refining Plant of the Boston and Montana Consolidated Copper and Silver Mining Co., Great Falls, Mont.

Albert Daniel Oberly, C.E., Engineer Corps, H. C. Frick Co., Scottdale, Pa.

Joseph Michael O'Malley, A.C., M.D., Physician, 2217 South Broad Street, Philadelphia, Pa.

Robert Henry Eddy Porter, M.E., of the firm of Porter & Remsen, Engineers and Contractors, 39 Cortlandt St., New York City. Residence: 39 Washington Square.

Arnold Karthaus Reese, B.S., E.M. ('90), Superintendent, Blast Furnace Department, Maryland Steel Co., Sparrow's Point, Md. Residence: 604 C Street.

Abraham Lincoln Rogers, M.E., President of the National Brewing Co., Jeannette, Pa.

Charles William Schwartz, jr., M.E., Secretary and Business Manager, Philadelphia Textile Machinery Co., 2720 Hancock St., Philadelphia, Pa. Residence: 43 Tulpehocken St., Germantown, Pa.

Arthur Moult Smyth, B.S., E.M. ('90), 66 Quintarda, Rio de Janeiro, Brazil.

Alfred Walton Stockett, C.E., Mine Surveyor, Geldenhuis Deep Gold Mining Co., P. O. Box 1906, Johannesburg, South African Republic.

Lester Clark Taylor, C.E., F. C. Central Norte, Cordova, Argentine Republic, S.A.

Augustus Thompson Throop, C.E., Assistant Superintendent, Dobbie Foundry and Machine Co., Niagara Falls, N. Y. Residence: 6 C Street.

Charles Prentice Turner, M.E., with the International Correspondence Schools, Scranton, Pa. Residence: 1214 Vine Street.

Clarence Walker, B.S., E.M. ('90), Assistant to Engineer of the Consolidated Traction Companies, *Times* Building, Pittsburg, Pa. Residence: 5757 Parker Street.

Fritz August Weihe, M.E., Ph.D. (Berlin '97), Professor of Physics and Electrical Engineering, N. C. College of Agriculture and Mechanic Arts, Raleigh, N.C.

Walter Earle Weimer, A.C., 724 Cumberland Street, Lebanon, Pa.

Harry Rush Woodall, B.S. (in Mining and Metallurgy), Second Assistant, Second City Survey District, 630 Wood St., Philadelphia, Pa.

Edward Austin Wright, C.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 208 T Street, N. W.

Joseph Bodine Wright, C.E., Structural Engineer, with Milliken Brothers, 39 Cortlandt Street, New York City. Residence: 424 W. 23d Street.

CLASS OF 1890.

Thomas C. J. Baily, jr., C.E., Assistant Engineer, Office of Engineer Commissioner, District Building, Washington, D.C. Residence: 1207 Lydecker Avenue, Columbia Heights, Washington.

Frederick Richard Barrett, C.E., Roadmaster, Pocahontas Division, Norfolk & Western Ry., Bluefield, W. Va.

Edwin Herbert Beazell, C.E., Superintendent of Erection, Fort Pitt Bridge Works, Pittsburg, Pa. Residence: 731 North Avenue (Station D).

Adolph Cardenas, C.E., Engineer Corps, Nicaragua Canal, Managua, Nicaragua, C. A.

William Phelps Cleveland, A.C., Superintendent of Empire Zinc Co., Joplin, Mo. Residence: 515 Wall St.

Frank Raymond Coates, B.S., E.M. ('91), Roadmaster, New York Division, N. Y., N. H. & H. R. R. R., Stamford, Conn.

Warren Scott Cope, C.E., Civil and Mining Engineer, McDowell, McDowell Co., W.Va.

Charles Ellery Coxe, B.S., E.M. ('91), Assistant to Manager of the Lixiviation Plant, Hacienda de Platas, Zacatecas, Mexico. Permanent address: care of Mr. W. E. C. Coxe, Toledo, O.

James Barlow Cullum, A.C., General Sales Agent, Harbison & Walker Co., 22d and Railroad Sts., Pittsburg, Pa.

John William DeMoyer, C.E., Supervisor, Philadelphia & Reading R. R., Pine Grove, Pa.

*Clement Heyser Detwiler, C.E.

Charles Edward Fink, C.E., Draftsman and Computer of Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa. Residence: Camphill, Cumberland Co., Pa.

*Frederick Elmer Fisher, C.E.

Frank Roberts Fisher, C.E., Bureau of Surveys, 1845 N. 22d Street, Philadelphia, Pa.

Howard Augustus Foering, B.S. (Sci.), Principal Lehigh Preparatory School, Bethlehem, Pa.

Ralph Goodman, C.E., Assistant Supervisor, Philadelphia Yards, Pennsylvania R. R., 32d Street and Powelton Avenue, Philadelphia, Pa. Residence: 1220 Reed Street.

George Ellsworth Greene, C.E., Assistant Engineer, Erie Canal, 757 Powers Bldg., Rochester, N. Y. Residence: 309 East Avenue.

Harry Walter Harley, M.E., care of H. M. Harley, Gloucester City, N.J.

David Garth Hearne, C.E., Foreman Steel Department, Riverside Iron Works, Wheeling, W. Va.

James S. B. Hollinshead, B.S., E.M. ('91), Mining Engineer, Butte & Boston Consolidated Mining Co., Butte, Montana.

Frederic Kidder Houston, M.E., Illustrator, *The New York Recorder*. Residence: Ridgewood, N.J.

William Vincent Kulp, C.E., with Milliken Brothers, Engineers and Contractors, 39 Cortlandt Street, New York City.

Henry Meyers Kurtz, C.E., General Superintendent of Mines for Harbison & Walker Co. of Pittsburg, Clearfield, Pa.

Harry Kinzer Landis, B.S., E.M. ('91), Editor, 280 Broadway, New York City. Residence: 204 Columbia Heights, Brooklyn, N. Y.

Thomas Smith Leoser, A.C., Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: 451 Madison Ave., Elizabeth, N.J.

*Deceased.

John Elmer Litch, M.E., with Pennsylvania Steel Co., Steelton, Pa.

Charles Herbert Miller, A.C., C. H. Miller Hardware Co., Huntingdon, Pa.

George Nauman, jr., C.E., with the Pennsylvania R. R. Engineer Corps, Delair, N.J.

Robert Engler Neumeyer, C.E., Borough Engineer of Bethlehem, Borough Engineer of South Bethlehem, Water Superintendent for the Bethlehem Water Co. Residence: 16 Goepp St., Bethlehem.

William Cassidy Perkins, C.E., Master in Mathematics, The Mellen School, 274 Lexington Avenue, Buffalo, N. Y. Residence: Station A, Niagara Falls, N.Y.

Asa Emory Phillips, C.E., Assistant Engineer, Engineer Department of the District of Columbia, District Building, Washington, D. C. Residence: Takoma Park, Washington, D. C.

Charles Platt, A.C., Ph.D. (Ohio University), F.C.S., Consulting Chemist, Professor of Chemistry and Toxicology, Hahnemann Medical College, Philadelphia.

Alexander Potter, C.E., Consulting Civil Engineer, Rooms 80-84, 137 Broadway, New York City.

Edward Williams Pratt, M.E., General Inspector, Chicago & Northwestern Ry., Chicago. Residence: 425 South Elmwood Avenue, Oak Park, Ill.

Edwin Jay Prindle, M.E., LL.M., Assistant Examiner, U.S. Patent Office. Address: P.O. Box 73, Washington, D.C.

Wallace Carl Riddick, C. E., Professor of Mathematics and Civil Engineering, North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N.C.

John Stover Riegel, M.E., General Manager, Warren Mfg. Co., Riegelsville, Warren Co., N. J.

Joseph Edgar Sanborn, A.C., Chemist, Empire Zinc Works, Joplin, Mo.

Henry John Sherman, C.E., member of firm, Henry S. Haines, Civil Engineers, Roads, Sewerage, Water Works, etc., 313 Masonic Temple, Camden, N.J. Residence: Broad Street, Mount Holly, N.J.

William Calvin Shoemaker, C.E., Assistant Superintendent, Dayton and Michigan Division, C. H. & D. Ry., Lima, Ohio.

Michael Druck Sohon, A.C., M.S. ('95), Ph.D. (Johns Hopkins), Instructor in Chemistry, Mixed High School, New York City. Residence: 3080 Third Avenue.

William Alston Stevenson, M.E., Superintendent, Stearns Mfg. Co., Engine, Boiler, and General Machine Builders, Erie, Pa. Residence: 225 West 11th St.

Theodore Alfred Straub, C.E., Vice-President and General Manager, Fort Pitt Bridge Works, Pittsburg, Pa. Residence: Canonsburg, Pa.

Francis du Pont Thomson, M.E., Superintendent, Copper and Brass Rolling Mills, C. G. Hussey & Co., Pittsburg, Pa. Residence: 4737 Bayard Street.

Charles Cookman Tomkinson, M.E., Chief Draftsman for Stearns Mfg. Co., 329 West 5th Street, Erie, Pa.

Claude Allen Porter Turner, C.E., Principal Assistant Engineer, Gillette-Herzog Manufacturing Co., Minneapolis, Minn.

Aaron Howell Van Cleve, C.E., Assistant Engineer, in charge of drafting-room, Cataract Construction Co., Power House, Niagara Falls, N.Y. Residence: 5 West C Street.

José Ramon Villalon y Sanchez, C.E., Lieutenant Colonel in Cuban Army, Secretary of Cuban Commission to Washington. Present address: The Raleigh, Washington, D.C.

Samuel Dexter Warriner, B.A. (Amherst), B.S., E.M. ('90), Superintendent Calumet & Hecla Mining Co., Calumet, Mich.

David Thomas Williams, M.E., Assistant Inspector of Ordnance, U. S. A., Falls Rivet and Machine Co., Cuyahoga Falls, O.

Herbert Wright, M.E., Assistant Examiner, U. S. Patent Office, Washington, D. C.

CLASS OF 1891.

Murray Blachly Augur, E.E., Train Master, Lehigh Valley Railroad, Buffalo, N. Y.

James Edwin Boatrite, C.E., B.A. (S. W. Presbn. Univ.), 85 Madison Ave., New York City.

J. W. Boyd, C.E., Division Engineer, Coal Department, Delaware and Hudson Canal Co., Room 25, D. & H. C. Co. Depot, Scranton, Pa.

John Emery Bucher, A.C., Ph. D. (Johns Hopkins), Associate Professor of Chemistry, Rhode Island Agricultural College, Kingston, R.I.

Jacob Burr Buckley, E.E., Carpenter and Builder, Oxford, N.Y.

Emanuel Chao, C.E., Cienfuegos, Cuba.

Edward Haviland Coxe, C.E., Mining Engineer, Sunday Creek Coal Co., Corning, Perry Co., O.

Warder Cresson, M.E., with Lehigh Valley Railroad Co., Swarthmore, Delaware Co., Pa.

John Rose Davis, C.E., Division Engineer, Chicago and Erie Division, Erie R. R., Huntington, Ind.

Eric Doolittle, C.E., Flower Observatory, Upper Darby P. O., Philadelphia, Pa.

Alban Eavenson, A.C., Chemist, J. Eavenson & Sons, 313 N. Twentieth St., Philadelphia, Pa. Residence: 2013 Vine Street.

Juan de la Cruz Escobar, M.E., Mechanical Engineer and Contractor, Matanzas, Cuba.

Walton Forstall, E.E., Assistant Engineer of Distribution, Philadelphia Gas Works, 1321 Filbert Street, Philadelphia, Pa. Residence: Ardmore, Pa.

John Stillwell Griggs, jr., M.E., Consulting Engineer, 99 Cedar Street, New York City. Residence: 194 Park Place, Brooklyn, N. Y.

George Samuel Hayes, C.E., Treasurer and Engineer for the Tostevin-Hayes Fireproof Construction Co., 1123 Broadway, New York City. Residence: 27 West 15th Street.

John Sidney Heilig, M.E., Secretary Lenox Manufacturing Co. of Penna., Allentown, Pa. Residence: 529 Allen Street.

William Albert Heindle, C.E., Engineer, City and Suburban Railway of Washington, D. C. Residence: 1212 E. Capitol Street.

John Franklin Hersh, C.E., Hardware Merchant, 825 Hamilton Street, Allentown, Pa.

Hermann Victor Hesse, B.S., E.M. ('92), Lehigh Valley Coal Co., Lost Creek, Pa.

Paul Depue Honeyman, E.E., Chief Foreman, in charge of Underground and Central Office, The Metropolitan Telephone and Telegraph Co., 18 Cortlandt St., New York City.

John Turner Hoover, B.S. (in Architecture), Philipsburg, Pa.

Hagime Ichikawa, A.C., Imperial Printing Bureau, Tokio, Japan.

Albert Edward Juhler, A.C., Chemist, Standard Oil Co., Olean, N.Y. Residence: 323 North 4th Street.

Henry Kemmerling, C.E., Teaching, 2623 North Main Ave., Scranton, Pa.

Herman Meriwether Knapp, C.E., Contracting Engineer for the Pittsburg Bridge Company, American National Bank Building, Louisville, Ky.

Rev. Frederic Curtiss Lauderburn, B.A., Rector Calvary Protestant Episcopal Church, Tamaqua, Pa.

Charles McKnight Leoser, B.S., E.M. ('92), Publisher *Bonfort's Wine and Spirit Circular*, 34 Beaver Street, New York City. Residence: 66 Harrison Street, East Orange, N. J.

James Anderson McClurg, B.S. (in Metallurgy), Meadville, Pa.

Frank Anderson Merrick, E.E., Manager Motor Department, Lorain Steel Co., Johnstown, Pa.

John Zollinger Miller, E.E., Manager and Superintendent of the Mutual Telephone Co., Room 32, Downing Building, Erie, Pa.

Harry Timothy Morris, M.E., Armor Plate Department, Bethlehem Iron Co., South Bethlehem, Pa. Residence: P.O. Building, Bethlehem.

Paul Mayo Paine, C.E., First Sergeant, Co. A, 203d Regt., New York Volunteers. Residence: 101 White Street, Syracuse, N.Y.

Edwin Addams Quier, A.C., Secretary, Reading Fire Brick Works, Reading, Pa. Residence: 302 South 5th Street.

Walter Freeman Rench, C.E., Assistant Supervisor, P.R.R., St. Mary's, Pa.

Robert Schmitz, C.E., United States Surveyor, U. S. Engineer Office, Lock Box 812, Philadelphia, Pa. Residence: 1420 Poplar Street.

Ellis Anstett Schnabel, B.A., M.A.('93), Assistant Professor of Latin and Greek, Central High School, Broad and Green Sts., Philadelphia, Pa. Residence: 1630 North 16th Street.

Leidy Rudy Shellenberger, C.E., Assistant Engineer, Pencoyd Iron Works, Pencoyd, Pa. Residence: 215 Rochelle Avenue, Wissahickon, Philadelphia, Pa.

Ira Augustus Shimer, B.A., M.D. (Univ. Pa. '97), First Lieutenant and Assistant Surgeon, U. S. A., Fort Myer, Va.

Horace Theodore Stilson, C.E., 629 Salem Street, Malden, Mass.

R. Paul Stout, M.E., Ordnance Designer, Bethlehem Iron Company, South Bethlehem, Pa. Residence: 332 Market Street, Bethlehem.

James Edward Talmage, A.C., Ph.D., F.R.M.S., F.R.S.E., F.G.S., F.G.S.A., Deseret Professor of Geology, University of Utah, Salt Lake City, Utah.

William Sidney Topping, B.S. (Lat. Sci.), Ph. G., Druggist, Main Street, East Islip, N. Y.

Domingo Anthony Usina, C.E., Assistant Examiner of Patents, Room 32, Patent Office, Washington, D.C. Residence: 409 Fifteenth Street, N.W.

Elias Vander Horst, C.E., with W. R. Fleming & Co., 620 Atlantic Avenue, Boston, Mass.

George Edward Wendle, E.E., Lycoming Electric Co., Williamsport, Pa.

Peyton Brown Winfree, C.E., City Engineer, Bradford, Pa.

CLASS OF 1892.

Rev. William North Robins Ashmead, B.A., Missionary, Chapel of the Prince of Peace, Gettysburg, Pa.

*George W. B. Asmussen, C.E.

Robert Ligget Baird, C.E., Engineer Corps, P. R. R., Mifflintown, Pa.

Joseph Barrell, B.S., E.M. ('93), M.S. ('97), Graduate Student, Yale University, New Haven, Conn. Residence: 373 Crown Street.

John Young Bassell, jr., B.S., E.M. ('95), Hotel Chittenden, Columbus, O.

John Newbaker Bastress, C.E., Shamokin, Pa.

John Mayall Beaumont, M.E., 125 South Seventh Street, Scranton, Pa.

William Williams Blunt, E.E., Engineer, Westinghouse Electric Co., Limited, 32 Victoria Street, London, S. W., England.

William Young Brady, B.S. (in Architecture), Architect, Stevenson Building, Sixth Avenue, Pittsburg, Pa.

Charles Merritt Case, B.S., E.M. ('93), Secretary George C. Bagley Elevator Co. and Treasurer Royal Elevator Co., 55 Chamber of Commerce Building, Minneapolis, Minn. Residence: Colonial Apartments.

George Price Case, B.S., E.M. ('93), Secretary Royal Elevator Co., Wholesale Grain, 55 Chamber of Commerce, Minneapolis, Minn. Residence: 1908 Park Avenue.

Philip Lothrop Cobb, C.E., 2509 Euclid Avenue, Cleveland, O.

Frederick Albert Coleman, C.E., City Engineer, City Hall, Rome, N.Y.

* Deceased.

Samuel Dewey Cushing, M.E., Asst. Supt. Binghamton General Electric Co., 79 State St., Binghamton, N. Y. Residence: 52 Main St.

Herman Haupt Davis, M.E., General Manager of the Galisteo Mining Co., Cerrillos, New Mexico.

Morgan Davis, jr., B.S. (in Mining), of Leighton & Davis, Engineers, Box 207, Scranton, Pa.

William Russell Davis, C.E., Bridge Engineer, City of New York, 3d Ave. and 177th St., Borough of the Bronx, New York City. Residence: 1455 Washington Avenue.

Heber Denman, B.S. (in Mining), Assistant Engineer, Berwind-White Coal Mining Co., Scalp Level, Cambria Co., Pa.

Edwin Dodge, B.S. (in Metallurgy), Gouverneur, N. Y.

Percival Drayton, M.E., Superintendent Blooming and Bar Mills, Apollo Iron and Steel Co., Vandergrift, Westmoreland Co., Pa.

*Harry S. Eckert, A.C.

Lester Hallett Ely, A.C., care of Coxe Brothers & Company, 143 Liberty Street, New York City. Residence: 26 E. Third Street, Bayonne, N.J.

George Washington Engel, B.S., E.M. ('93), with the Delaware & Hudson Coal Co., Scranton, Pa.

Thanlow Gjertsen, C.E., Engineer in charge, Clinton Cement Co., Pittsburg, Pa. Permanent address: Saxton, Pa.

*John Adams Gruver, B.A.

William Lawall Jacoby, M.E., Sales Agent, Latrobe Steel and Coupler Company, 1720 Old Colony Building, Chicago, Ill.

Alfred Emerson Jessup, B.S. (in Metallurgy), Assistant Superintendent, Blast Furnace Department, Maryland Steel Co., Sparrow's Point, Md. Residence: 507 C St.

Juan Jose Jimenez, C.E., 566 Washington Avenue, Brooklyn, N.Y.

Herman Eugene Kiefer, A.C., M.S. ('94), Ph. D. ('96), Instructor in Geology, Lehigh University. Residence: 438 Cherokee Street, South Bethlehem, Pa.

*Deceased.

Robert Reed Kitchel, M.E., with E. D. Leavitt, Mechanical Engineer, Cambridgeport, Mass.

Sylvester Welch Labrot, C.E., Assistant Engineer, L. C. & L. Division, L. & N. R. R., Louisville, Ky. Residence: St. James Court.

Henry Lefevre, B.S., E.M. ('93), Asst. Engineer, Playa de Oro Gold Mining Co., Playa de Oro, Ecuador. Permanent address: care Henry Lefevre, Panama, Republic of Colombia, South America.

Alfred Emory Lister, M.E., Mechanical Engineer for Delaware & Hudson Canal Co., Coal Department, Room 27 D. & H. Station, Scranton, Pa.

William John Lloyd, E.E., Stanley Electric Mfg. Co., Pittsfield, Mass.

John Taylor Loomis, E.E., Collector, Real Estate Department, P. & R. R. R., Reading Terminal, Philadelphia. Residence: 503 South 41st Street.

Henry Lewis Manley, B.S., E.M. ('93), Division Engineer, Lehigh Valley Coal Co., Hazleton, Pa. Residence: 58 North Laurel Street.

Raymond S. Masson, E.E., District Engineer, Westinghouse Electric & Manufacturing Co., Mills Building, San Francisco, Cal.

Edward James Millar, C.E., Civil and Sanitary Engineer, 19 Masonic Temple, Wheeling, W. Va.

Charles Tyler Mosman, E.E., Electrical Engineer, Assistant Engineer, Light Department, General Electric Co., Schenectady, N.Y. Residence: 18 Gillespie Street.

Robert Blum Olney, C.E., Superintendent of Sewers, City Hall, Charleston, S. C. Residence: 139 St. Philip Street.

Henry Orth, jr., B.S., E.M. ('93), Patent Attorney, 1011 L Street, N. W., Washington, D.C.

Ramon Eckhart Ozias, B.S. (in Metallurgy), Assayer, U. S. Laboratory, 641 Washington Street, New York City.

Frank DeWitt Randolph, M.E., Head Draftsman, C. Potter, jr., & Co., Manufacturers of Printing-Presses, 444 W. Front Street, Plainfield, N.J.

Robert Swenk Rathbun, C.E., Manager Lehigh Engineering Co., 5 Paxson Building, Allentown, Pa. Residence: 42 North Jefferson Street.

Samuel Arthur Rhodes, E.E., Engineering Department, Chicago Telephone Co., Chicago, Ill. Residence: 429 N. Pine Avenue, Austin, Ill.

John Ira Riegel, C.E., Division Engineer, Auburn Division, Lehigh Valley R. R., Auburn, N. Y. Residence: 28 Court Street.

Anton Schneider, C.E., Assistant Engineer, Oregon Short Line R. R., Salt Lake City, Utah.

John Bonner Semple, A.C., Secretary of Sterling Varnish Co., 325 Water Street, Pittsburg, Pa. Residence: Sewickley.

Cass Knight Shelby, M.E., Motive Power Department, P. R.R., Altoona, Pa. Address: P. O. Box 314.

James Causten Shriver, C.E., Civil Engineer, 4 Water Street, Cumberland, Md.

Philip Henry Waddell Smith, E.E., Assistant General Manager of Standard Underground Cable Co., Westinghouse Building, Pittsburg, Pa. Residence: 6730 McPherson Street.

Michael Neligan Usina, E.E., Past Assistant Engineer, U. S. N. Residence: 401 Waldburg Street, West Savannah, Ga.

Lester Warren Walker, E.E., of L. W. Walker & Co., Electrical Engineers and Contractors, 40 Drayton St., Savannah, Ga.

David Heikes Witmer, C.E., Assistant Engineer, American Pipe Manufacturing Co., 112 North Broad Street, Philadelphia, Pa. Residence: 810 North 16th Street.

Frederic Wittman, A.C., Attorney-at-Law, Allentown, Pa. Residence: Lanark, Pa.

Charles Oaks Wood, M.E., with T. B. Wood's Sons, Manufacturers of Machinery for the Transmission of Power, Chambersburg, Pa.

Byron Edgar Woodcock, C.E., with the California Eastern Railway Co., 132 Stimson Block, Los Angeles, Cal.

CLASS OF 1893.

George Haldeman Atkins, C.E., Pottsville, Pa.

Harry Jacobs Atticks, E.E., Lisburn, Pa.

Hugh Cunningham Banks, C.E., General Engineering, Room 344 Equitable Building, Atlanta, Ga.

Noble C. Banks, B.S. (in Metallurgy), Acting General Manager, Valley View Gold Mining Co., Telluride, Col. Permanent address: care of John T. Graham, Esq., 604 Equitable Building, Denver, Col.

Herman Renner Blickle, C.E., Secretary and Chief Engineer, Fort Pitt Bridge Works, Pittsburg, Pa.

William Irvin Boyd, C.E., District Engineer's Office, No. 70 I Street, N.E., Washington, D.C.

Frederick Edgar Bray, C.E., with the Pittsburg Bridge Co., 38th St. and A. V. R. R., Pittsburg, Pa. Residence; 227 Fisk Street.

Gilbert Forbes Burnett, B.S. (Sci.), Accountant, Washington Life Building, New York City. Residence: Pompton Plains, N. J.

George Edwin Chamberlain, A.C., Superintendent, The Glucose Sugar Refining Company, Beach and Taylor Sts., Chicago, Ill. Residence; 3032 South Park Ave.

Warren Fellman Cressman, C.E., Sellersville, Pa.

Walter Joseph Dech, B.A., Teaching, Department of Greek, Albright College, Myerstown, Pa.

Rev. Charles Malcolm Douglas, B.A., Missionary, All Saint's Church, Leonia, N. J.

Charles Hazard Durfee, E.E., Insurance and Real Estate Broker, Treasurer People's Cooperative Bank, 60 Bedford Street, Fall River, Mass. Residence: 807 High Street.

Bernard Enright, A.C., Assistant Chief Chemist, Bethlehem Iron Company, South Bethlehem, Pa. Residence: 330 East 4th Street.

Henry Brown Evans, M.E., Instructor in Astronomy, University of Pennsylvania. Address: Flower Observatory, Upper Darby, Delaware Co., Pa.

George Harwood Frost, M.E., B.A.Sc. (McGill University '96), traveling in Europe. Permanent address: care of *Engineering News*, New York City.

Frederick Pardee Fuller, E.E., Assistant Chief Foreman, Construction Department, New York Telephone Co., 32 Gold Street, New York City. Residence: The Kenmore, 353 West 57th Street.

Robert Foster Gadd, C.E., Estimator, with Levering & Garrigues, 552 - 554 W. 23d Street, New York City. Residence: 67 West 48th Street.

Charles Willits Gearhart, E.E., General Foreman Electrical Department, Bridge Division, Brooklyn Elevated R. R. Co. Residence: 101 Berkeley Place.

Harvey Hartzell Godshall, A.C., of the firm of A. C. Godshall & Co., Millers, Lansdale, Pa.

Samuel Laury Graham, A.C., Analytical Chemist and Assayist, Rome Testing Laboratory, Rome, Ga.

Lee Stout Harris, C.E., Civil, Mining, and Electrical Engineer, for Pulaski Iron Co., Eckman, W.Va.

Claude Sanford Haynes, C.E., Assistant City Engineer, City Hall, Elmira, N.Y. Residence: 205 W. Hudson Street.

Richard Willis Heard, E.E., Swissvale, Pa.

Robert Culbertson Hays Heck, M.E., Instructor in Mechanical Engineering, Lehigh University, South Bethlehem, Pa.

Charles Lincoln Keller, M.E., with the Scherzer Rolling Lift Bridge Co., Chicago, Ill. Residence: 5510 Washington Avenue.

Schuyler Brush Knox, C.E., Assistant Engineer, Fort Pitt Bridge Works of Pittsburg. Residence: Canonsburg, Pa.

Frank Sigismund Loeb, A.C., Assistant Superintendent, Duquesne Reduction Co., Pittsburg, Pa.

Hiram Dryer McCaskey, B.S. (in Mining), Head Master, St. Thomas Hall, Holly Springs, Miss.

Charles Louis McKenzie, C.E., with the Shiffler Bridge Co., 1214 Betz Building, Philadelphia, Pa. Residence: Lansdowne, Pa.

William Price Marr, E.E., Superintendent, Shamokin & Mt. Carmel Electric Railway Co., Shamokin, Pa.

Archibald Stewart Maurice, C.E., Athens, Pa.

George Holbrooke Maurice, C.E., Athens, Pa.

James Edgar Miller, M.E., Electrical Engineer for the Siemens & Halske Electric Co. of America, 1215 Monadnock Block, Chicago, Ill. Residence: 2251 Calumet Ave.

William Frederick Mylander, C.E., 509 North Carrollton Avenue, Baltimore, Md.

Clinton Ledyard Olmsted, C.E., Eagle, N. Y.

Charles Joseph O'Neill, E.E., Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 910 Massachusetts Avenue, N.E.

Nathaniel Montgomery Osborne, jr., C.E., 171 Freemason Street, Norfolk, Va.

Charles William Parkhurst, E.E., Electrical Department, Union Iron Works, San Francisco, Cal. Residence: 133 Ellis Street.

Duncan White Patterson, M.E., Inspector, R. W. Hildreth & Co., 32 Broadway, New York City. Residence: Danville, Pa.

John Gates Peck, C.E., care of Milliken Brothers, 39 Cortlandt Street, New York City. Residence: 12 East 32d Street, Bayonne, N.J.

Raymond Bernard Fitz Randolph, A.C., Fellow in Bacteriology, Hoagland Laboratory, Brooklyn, N.Y. Residence: 106 Waverly Place, New York City.

John Graham Reid, C.E., Chief of Surveys, Union Traction Co., Philadelphia, Pa. Residence: 2412 Stanley Street.

Edwin Clark Reynolds, C.E., Topographer, U. S. Survey for Deep Waterways, Cohoes, N.Y. Residence: 87 Mohawk Street.

Francis Evans Richards, C.E., Cobbs Switch, Lowndes Co., Miss.

George William Ritchey, B.S. (Lat. Sci.), 26 Bluff Street, Pittsburg, Pa.

Frederick Brittan Sage, E.E., Manager, American Electric Specialty Co., 123 Liberty Street, New York City. Residence: Hackensack, N. J.

*Martin Luther Saulsbury, C.E.

Joseph A. Schloss, A.C., Public Assayer and Chemist, P. O. Box 65, Monterey, Mexico.

Armin Schotte, C.E., care of Riter and Conley, Allegheny, Pa. Residence: 237 Fisk St., Pittsburg, Pa.

William Frederick Semper, A.C., Chemist, Haskel & Barker Car Co., 832 Pine Street, Michigan City, Ind.

Alexander Beatty Sharp, B.S. (in Metallurgy), General Manager, W. L. Sharp & Son, manufacturing fireplace goods, Steubenville, Ohio.

Noel W. Smith, C.E., Assistant Supervisor P., W. & B. R. R., Broad and Carpenter Streets, Philadelphia, Pa.

Edward Auguste Soleliac, B.S. (in Metallurgy), Assistant Manager Adelaide Silk Mills, Allentown, Pa. Residence: 103 North 4th Street.

George Stern, B.A., Attorney-at-Law, 619 Mutual Life Building, Philadelphia, Pa.

William Remick Stinemetz, E.E., with the Westinghouse Electric and Manufacturing Co., Pittsburg, Pa. Residence: 127 Linden Avenue.

Thomas Harrison Symington, M.E., Superintendent of Motive Power, Atlantic Coast Line R. R., Wilmington, N. C. Residence: 314 Orange Street.

John Taylor, A.C., 244 Market Street, Bethlehem, Pa.

Lewis Esler Troutman, E.E., Testing Department, General Electric Co., Schenectady, N.Y. Residence: 563 Liberty St.

Fred Conover Warman, C.E., Assistant Engineer, United States Engineer Office, Washington, D.C. Residence: 3226 16th Street, N. W.

CLASS OF 1894.

William A. Allgaier, B.S., E.M. ('95), with T. B. Haystoz Co., Limited, Gold and Silver Refiners, 709 Sansom Street, Philadelphia, Pa. Residence: 256 Sumac Street.

* Deceased.

William Conklin Anderson, E.E., Superintendent at Red Bank, N.J., for the Consolidated Gas Company of New Jersey. Residence: 47 Rector Place, Red Bank, N. J.

George Washington Scott Baton, B.S. (in Mining), Division Engineer with H. C. Frick Coke Co., Scottdale, Pa.

Irvin Isaac Beinhower, M.E., Draftsman, Lincoln Iron Works, Rutland, Vt. Residence: Brock House.

Thomas Joseph Bray, jr., M.E., Secretary and Mechanical Engineer, McGill & Co., Engineers and Machinists, 27th and Smallman Sts., Pittsburg, Pa.

Lawrence Calvin Brink, C.E., 166 West 126th Street, New York City. Employed by N.Y.C. & H.R. R.R. Co.

Rezeau Blanchard Brown, M.E., Gas-fitter, 4876 West 48th Street, Cincinnati, O.

Emott Davis Buel, C.E., Chief of Hydrographical Party, U. S. Army Engineer Corps, Hudson River Improvement, 51 State Street, Albany, N. Y. Residence: 21 South Hawk Street.

James Lindsey Burley, C.E., Civil Engineer, associated with Nathan F. Barrett, Landscape Architect, 50 Wall St., New York City. Residence: Hotel Majestic, West 72d Street.

William Colwell Carnell, A.C., Chemist, Nelson Morris & Co., U. S. Yards, Chicago, Ill. Residence: 3232 Wabash Avenue.

Thomas Francis Carroll, B.S. (Latin-Sci.), Towanda, Pa.

Alden Brown Diven, C.E., Secretary The La France Fire Engine Co., Elmira, N.Y. Residence: 957 Lake Street.

Water Jules Douglas, C.E., Assistant Engineer to the Engineer Commissioner, Washington, D.C. Residence: 1412 29th Street.

Walter Sewell Dunscomb, C.E., Designer and Draftsman, Webster, Camp & Lane Machine Co., Akron, O.

Thaddeus Percival Elmore, C.E., Assistant Manager, Havana Bridge Works, Montour Falls, N. Y.

Theodore Gwathmey Empie, E.E., Engineering Department, N. Y. and N. J. Telephone Co., 16 Smith Street, Brooklyn, N. Y.

Frank Faust, E.E., Foreman, The Jackson & Woodin Mfg. Co., Berwick, Pa.

James DuBose Ferguson, C.E., Major, First Regiment, U. S. Volunteer Engineers, Army Building, 39 Whitehall Street, New York City.

Robert Ferriday, C.E., Assistant Engineer, Chicago Division, P. C. C. & St. L. R. R., Logansport, Ind.

Richard Daniel Floyd, A.C., Manager Floyd Bros. & Co., 190 West Broadway, New York City. Residence: Hotel Endicott, 81st Street and Columbus Avenue.

John Jacob Frank, E.E., General Electric Co., Schenectady, N.Y. Residence: 442 State St.

Luther L. Gadd, E.E., with Levering & Garrigues, 552-554 West 23d Street, New York City. Residence: 67 West 48th Street.

Frank Wieseman Glading, M.A. (Phila. Central High School), M.E., M.S. (Cornell), Electrical Engineer with The Edison Manufacturing Co., Orange, N.J. Residence: 363 West 22d Street, New York City.

Milton Brayton Graff, A.C., Asst. Chemist for Proctor & Gamble Co., Ivorydale, Ohio. Residence: 405 Union Street, Avondale, Cincinnati, O.

Elwood Aristides Grissinger, E.E., Electrical Engineer and Salesman, Westinghouse Electric and Manufacturing Co., 782 Ellicott Square, Buffalo, N.Y. Residence: 273 Highland Avenue.

Bayard Guthrie, M.E., Superintendent, A. M. Guthrie & Co., 21st and Smallman Streets, Pittsburg, Pa. Residence: 5978 Alder Street, E.E.

William McCleery Hall, M.A. (Franklin and Marshall), C.E., Assistant Master, Yeates Institute, Lancaster, Pa. Residence: 30 W. King St.

Fletcher Dickerman Hallock, E.E., Electrical Engineering, 308 West 5th Street, Plainfield, N.J.

Arthur Williston Henshaw, E.E., Engineering Department, General Electric Co., Schenectady, N.Y. Residence: 8 Union Street.

Anton Yost Hesse, C.E., Draftsman, The Phoenix Bridge Co., Phoenixville, Pa.

Foster Haven Hilliard, C.E., U. S. Dredging Fleet, Mississippi River Improvement, New Madrid, Mo. Permanent address: Monroe, N. C.

William Emley Holcombe, E.E., with the General Electric Co., Schenectady, N. Y.

Matthias Harry Holz, M.E., with Marr Construction Co., 463 New City Hall, Philadelphia, Pa. Residence: 1914 Girard Avenue.

Alfred A. Howitz, M.E., Box 628, Newport News, Va.

George Washington Hunsicker, A.C., Teacher of Elementary Science in the Allentown High School. Residence: 119 North 13th Street.

George Cass Hutchinson, M.E., Cass Realty Corporation, 209 East 23d Street, New York City. Residence: South Orange, N. J.

Arthur Bacon Jones, A.C., of the firm of Tate & Jones, Murtland Building, Pittsburg, Pa.

Barry Holme Jones, B.S., E.M. ('95), Manager, The Bloomsburg Elevator and Machine Works, Bloomsburg, Pa.

William Harrison Kavanaugh, M.E., Draftsman, Principal Assistant Engineer's Office, P. R. R., Williamsport, Pa. Residence: 1612 West 4th Street.

Richard Warren Knight, C.E., Engineering Department, Shiffler Bridge Co., Pittsburg, Pa.

Claude Averett Langdon, C.E., Draftsman, Pennsylvania Steel Company, Steelton, Pa. Address: 111 Locust Street, Harrisburg, Pa.

Harry Donaldson Leopold, C.E., with Shiffler Bridge Co., Pittsburg, Pa.

James Edwin Little, M.E., Draftsman, Bethlehem Iron Co., South Bethlehem. Residence: Hokendauqua, Pa.

Clarence Oliver Luckenbach, M.E., with Hale & Kilburn Mfg. Co., 48-50 North Sixth St., Philadelphia, Pa. Residence: 1718 North Fifteenth Street.

Matthew McClung, jr., B.S. (in Metallurgy), Chemist, Carrie Furnaces, Carnegie Steel Co., Rankin, Pa. Residence: 6730 McPherson Street., E. E., Pittsburg.

John Douglas McPherson, E.E., Electrical Engineer, care of Metropolitan Traction Co., Cable Building, 621 Broadway, New York City. Residence: 447 Fourth Avenue.

John VanSickle Martenis, M.E., with Terminal R. R. of the B. W. & W. Co., Pier 8, Robert Stores, Brooklyn, N. Y. Residence: 464 9th Street.

Joseph Oscar Mathewson, B.S. (in Metallurgy), Chemist for Ashland Coal & Iron Railway Co., Ashland, Ky.

*William Spencer Merrill, B.A., LL.B. (Cincinnati Law School).

Walter Hurxthal Miller, M.E., of the firm of Redding & Miller, Electrotypers, 794 Broad Street, Newark, N. J.

Charles Asher Moore, E.E., Hammonton, N.J.

Julius Lederer Neufeld, E.E., Instructor in Mathematics, Central High School, Philadelphia, Pa. Residence: 1909 South Broad Street.

Carl William Frederick Neuffer, C.E., Transitman for the Pennsylvania Coal Co., Dunmore, Pa. Residence: Fifth and Dudley Streets.

Charles Atwood Newbaker, E.E., with the Bell Telephone Co., Philadelphia, Pa. Residence: 1333 Arch Street.

Richard Leslie Ogden, A.C., Chemist, with the Carnegie Steel Co., Limited, Duquesne, Pa.

Jeremiah Francis O'Hearn, C.E., Shenandoah, Pa.

Godwin Ordway, B.S. (in Metallurgy), Assayer and Mining Engineer, Rossland, British Columbia.

William Arthur Payne, B.S. (in Architecture), Assistant Engineer, care of Ernest Flagg, Architect, 35 Wall St., New York City. Residence: 147 West 105th Street.

William Vaughan Pettit, B.S. (in Metallurgy), Director of Manufacture of Clay Products of Staten Island Terra Cotta and Lumber Co. Residence: 79 Water Street, Perth Amboy, N.J.

Stephen Collins Potts, A.C., Assistant Chemist, P. R. R., Altoona, Pa. Residence: 933 Sixteenth Street.

Thomas Charles Roderick, E.E., care of D. C. Street Railway Co., 12 Woodward Avenue, Detroit, Mich.

* Deceased.

Frank William Roller, M.E., of the firm of Machado & Roller, Electrical Engineers & Contractors, 203 Broadway, New York City.

Charles Beecher Rutter, B.S. (in Mining), Assistant Engineer, Lehigh Coal and Navigation Co., Lansford, Pa.

Herman Schneider, B.S. (in Architecture), Allentown, Pa.

Benjamin Ferdinand Schomberg, M.E., Motive Power Department, P.R.R., Altoona, Pa. Residence; 1209 16th Street.

Edgar Earnest Seyfert, C.E., Draftsman, Pottsville Iron & Steel Co., Pottsville, Pa.

George Elwood Shepherd, E.E., of the firm of Shepherd & Rust, Electrical Contractors, 19-21 N. Franklin St., Wilkes-Barre, Pa. Residence; 323 S. Main St.

Charles Elder Shipley, E.E., Garrison, Md.

Robert Eugene Smith, M.E., Works Inspector, Bethlehem Foundry and Machine Co. Residence: 135 West Broad Street, Bethlehem, Pa.

Herbert Ridley Stratford, A.C., Secretary, The George Stratford Oakum Co., Jersey City, N.J. Residence: 52 Danforth Avenue.

Walter Christian Swartz, M.E., 525 Turner Street, Allentown, Pa.

Frederick George Sykes, E.E., Superintendent, Edison Electric Illuminating Co. of Brooklyn, 360 Pearl Street, Brooklyn, N.Y. Residence: 311 Washington Avenue.

Charles Hamilton Thompson, B.S. (in Metallurgy), Mining Engineer and Chemist, Potts Valley Iron Co., Huddleston, Alleghany Co., Va.

Philip Henry Trout, jr., E.E., Staunton, Va.

Orson William Trueworthy, M.E.

Clarence Porter Turner, E.E., Wilkes-Barre, Pa.

Charles W. Underwood, E.E., Special Agent Wayleaves Department, New York Telephone Co., 15 Dey Street, New York City.

Jacob Daniel Von Maur, C.E., Foreman Special Mains, United Gas Improvement Co., 1321 Filbert Street, Philadelphia. Residence: 19th and Venango Streets.

Edward Olmstead Warner, E.E., Assistant Inspector of Railway Material for Japanese Government, 25 Capitol Avenue, Hartford, Conn.

Ruel Chaffee Warriner, B.S. (in Mining), care of Crown Deep Limited, Box 771, Johannnesburg, South African Republic.

Aubrey Weymouth, C.E., with Post & McCord, Engineers and Contractors, 287 Fourth Avenue, New York City. Residence: 210 W. 38th Street.

Thomas William Wilson, C.E., with the Pennsylvania Steel Co., Steelton, Pa. Now serving as Corporal, Eighth Regiment, Pennsylvania Volunteers.

Weldon Burris Wooden, C.E., Hampstead, Md.

CLASS OF 1895.

Herman Leon Arbenz, C.E., Engineering Department, Northern Pacific Railway Co., Tacoma, Washington.

Chester Terrill Ayres, E.E., with The People's Gas Light and Coke Co., Natural Gas Department, Michigan Avenue and Adams Street, Chicago, Ill. Residence: 4053 Lake Avenue.

Franklin Baker, jr., B.S. (in Mining), with the Franklin Baker Co., Manufacturers of Cocoanut Products, 233 North Water Street, Philadelphia, Pa. Residence: 916 Farragut Terrace.

Clarence Kemble Baldwin, M.E., Draftsman, with Crocker-Wheeler Electric Co., Newark, N. J.

Anthony Francis Bannon, jr., C.E., Assistant City Engineer, Bradford, Pa. Residence: 133 Congress Street.

John Collinson Barber, C.E., Surveyor, with Homestake & Associated Mining Co., Lead, S. D.

Robert Josiah Bartholomew, M.E., Bath, Pa.

Rollin Calvert Bastress, C.E., with the Berlin Iron Bridge Co., East Berlin, Conn.

Harry Wilber Beach, M.E., Manufacturer of Wood-working Machinery, Montrose, Pa.

George Wallace Beggs, C.E., with The York Manufacturing Co., York, Pa. At present Sergeant, Co. M., First Regiment U. S. Volunteer Engineers.

John Henry Best, C.E., with the First Regiment, U. S. Volunteer Engineers. Home address: Mechanicsburg, Pa.

Ernest Mar Blehl, E.E., Private Secretary to Superintendent, Western Union Telegraph Co., 1000 Chestnut Street, Philadelphia, Pa. Residence: 1520 Euclid Ave.

William Bowie, B.S. (Trinity), C.E. ('95), Aid, U. S. Coast and Geodetic Survey, Washington, D. C. Permanent address: Annapolis Junction, Md.

Charles Sumner Bricker, M.E., Testing Laboratory of the Chicago, Burlington & Quincy R.R., Aurora, Ill.

Robert Bruce Brinsmade, B.S. (Washington University, St. Louis), E.M. ('95), Draftsman, Mines of Anaconda Copper Mining Co., Butte, Mont.

James Emery Brooks, M.E., Contracting Agent, Shiffler Bridge Co., 45 Broadway, New York City.

Eugene Clare Brown, E.E., Assistant Examiner, U. S. Patent Office, Washington, D.C. Residence: 7 Quincy Street, N.E.

William Henry Brown, B.S., E.M. ('96), with the Engineer Corps of the Philadelphia & Reading Coal and Iron Co., Shamokin, Pa.

Walter Turpin Brown, C.E., Bridge and Construction Department, Pencoyd Iron Works, Pencoyd, Pa. Residence: Osborne Street, Wissahickon, Philadelphia.

James Hodgson Budd, C.E., Draftsman and Computer on Special Work, Street Railway Department, Pennsylvania Steel Co., Steelton, Pa.

Charles Calvin Burgess, C.E., Draftsman, Keystone Bridge Co., Pittsburg, Pa. Residence: 216 Fisk Street.

John Thomas Callaghan, jr., B.S., E.M. ('96), Assistant Inspector of Steel for the U. S. Navy Department, Homestead Steel Works, Munhall, Pa.

Francis Lee Castleman, C.E., with New Jersey Steel and Iron Co., Trenton, N.J.

Robert Edes Chetwood, E.E., Engineer's Department, American Telephone and Telegraph Co., 151–153 Cedar Street, New York City. Residence: 415 North Broad Street, Elizabeth, N. J.

Arthur Stebbins Clift, M.E., General Electric Co., Schenectady, N.Y.

William Wheeler Coleman, B.S. (in Metallurgy), with the Bethlehem Iron Co., South Bethlehem, Pa.

William Joseph Collier, C.E., Draftsman, B. & C. Department, Pennsylvania Steel Co., Steelton, Pa.

Morris Llewellyn Cooke, M.E., of the firm of Cooke, Beaumont & Co., Printers and Publishers, 200 South 10th Street, Philadelphia, Pa. Residence: 721 Pine Street.

Herbert Maurice Crawford, C.E., Engineering Corps, with the H. C. Frick Coke Co., Scottdale, Pa.

Henry M. S. Cressman, B.A., Principal of Public Schools, Egg Harbor City, N.J.

Howard Stephen Deck, M.E., Mechanical Engineer, Laflin & Rand Powder Co., 99 Cedar Street, New York City. Residence: Wayne, N. J.

Henry DeHuff, E.E., Electrical Engineer, D'Olier Engineering Co., 129 South 11th Street, Philadelphia. Residence: 601 North 18th Street.

Stanley Chipman deWitt, E.E., Inspector, Maintenance Department, Bell Telephone Co., Philadelphia, Pa. Residence: 813 North Broad Street.

James Chambers Dick, C.E., Engineer for Kansas and Texas Coal Co., Pittsburg, Kansas.

Beekman DuBarry, jr., M.E., Motive Power Department, Penna. R. R. Co., P. O. Box 112, Altoona, Pa.

Howard Eckfeldt, B.S., E.M.('96), Mining Engineer, Mazapil Copper Co., Limited, Concepcion del Oro (*via* Saltillo), Zacatecas, Mexico.

Alfred William Alexander Eden, C.E., Draftsman, Union Bridge Co., Athens, Pa.

Edward L. Faison, jr., C.E., Topographer on U. S. Geological Survey, Denison, Texas.

Guy Hector Farman, B.S. (in Metallurgy), 3400 Arapahoe Street, Denver, Col.

Edward Calvin Ferriday, B.A., with Laflin & Rand Powder Co., New York City. P. O. Address: Box 2308, New York City.

Walter Ferris, M.E., Assistant Chief Engineer, Pencoyd Iron Works, Pencoyd, Pa. Residence: 142 Rochelle Avenue, Wissahickon, Philadelphia, Pa.

*George Lane Gabrio, E.E.

Andres Garza Galan, C.E., Civil Engineering, Ocampo 53 B, Monterey, Mexico.

Eduardo Antonio Giberga y Galé, M.E., Chief Engineer, Electrical Department, Spanish-American Light and Power Co., Consolidated, Monte 1, Havana, Cuba. Residence: Virtudes 2 A.

John Jameson Gibson, E.E., Inspector, First District, Long Distance Branch, American Telegraph and Telephone Co., 18 Cortlandt St., New York City. Residence: 151 State St., Brooklyn.

Elmer Grant Godshalk, A.C., Lansdale, Pa.

Wallace Russell Goss, C.E., Civil Engineer, with the American Water Works and Guarantee Co., Pittsburg, Pa.

Frederick Taylor Haines, C.E., Attorney-at-Law, Elkton, Md. At present with the First Maryland Regiment, U. S. V.

Thomas Graham Hamilton, E.E., with the Consolidated Traction Co., Pittsburg. Residence: 5912 Margaretta Street.

Robert Rieman Harvey, E.E., Assistant Superintendent, Wyoming Valley Lace Mills, Wilkes-Barre, Pa. Residence: 10 S. Franklin Street.

Thomas Lloyd Henry, C.E., Klondike District, Alaska. Home address: 59 First Street, Troy, N. Y.

Howard Samuel Hess, B.A., law student, office of J. Davis Brodhead, Esq., South Bethlehem, Pa. Home address: Hellertown, Pa.

Ira Miller Higbee, C.E., Assistant Supervisor, Philadelphia and Erie R. R., Watsontown, Pa.

William Jacob Hiss, jr., E.E., Construction Department, Metropolitan Telephone and Telegraph Co., 18 Cortlandt Street, New York City. Residence: 44 Munn Avenue, East Orange, N.J.

* Deceased.

William Hopkins, E.E., First Lieutenant, First Regiment U. S. Volunteer Engineers. Permanent address: 1324 Eighteenth St., Washington, D. C.

Drew William Irvine, E.E., Electrician, Roanoke Electric Light and Power Co., Roanoke, Va. Residence: 502 Church Ave., S.W.

Charles Borrows Jacobs, A.C., Superintendent and Chemist of the Ampere Electro-Chemical Co., Ampere, N. J. Office, 44 Broad Street, New York City.

Elmer Augustus Jacoby, B.A., Instructor in Mathematics, Perkiomen Seminary, Pennsburg, Pa.

William Agassiz James, B.S. (in Mining), Mining Engineer, The Forest Mining Co., Scranton, Pa. Address: Peckville, Pa.

Henry Scudder Jaudon, C.E., Civil Engineer with Rittenhouse R. Moore, River and Harbor Improvement, Savannah, Ga. Residence: 207 East Gwinnett Street.

Albert Beardsley Jessup, B.S., E.M. ('96), Engineering Department, Shamokin Division, Lehigh Valley Coal Co., Centralia, Pa.

Elisha Barton John, E.E., Assistant Engineer's Office, Tyrone Division, P. R. R., Tyrone, Pa.

Adolph Somers Kappella, E.E., Delaware and Atlantic Telephone Co., 502 Bell Telephone Building, Eleventh and Filbert Streets, Philadelphia, Pa. Residence: 1100 North 40th Street.

Dixon Kautz, B.S. (Lat. Sci.), Deputy Collector, U. S. Custom House, Tacoma, Washington.

Warren Byron Keim, C.E., Instructor in Civil Engineering, Lehigh University, South Bethlehem, Pa.

Henry Edward Kip, B.S. (in Architecture), Architect, East Aurora, Erie County, N.Y.

David Henshey Lackey, E.E., Manager, Spring Street Office, New York Telephone Co., 138 Spring Street, New York City. Residence: 249 West 55th Street.

William Allen Lambert, B.A., Graduate in Theology, Mt. Airy Theological Seminary. Residence: Bethlehem, Pa.

Louis Edgar Lannan, E.E., 52 I Street, N.W., Washington, D.C.

Arthur Hughes Lewis, B.S., E.M. ('96), with the L. V. Coal Co., Engineering Department, Wilkes-Barre, Pa. Residence: Plains, Pa.

Gerald Lewis, A.C., Milford, Pike Co., Pa.

Benjamin W. Loeb, A.C., Chemist and Assayer, H. C. Harrison, Mining Engineer, Cerrabro, Nuevo Leon, Mexico.

Theodore Philip Lovering, E.E., Maintenance Department, New York Telephone Co. Residence: 216 Schermerhorn Street, Brooklyn, N. Y.

Robert A. McKee, M.E., with the Brooks Locomotive Works, Dunkirk, N. Y.

Fayette Avery McKenzie, B.S. (Sci.), Modern Languages and Social Science, Juniata College, Huntingdon, Pa.

Stuart Tuttle McKenzie, C.E., with the Shiffler Bridge Co., 1214 Betz Building, Philadelphia, Pa.

Norman Peach Massey, C.E., Engineer, P. O. Box 983, Springfield, Mass.

Charles Frazier Maurice, C.E., with G. H. Thomson & Co., 51 E. 44th Street, New York City.

John Samuel Miller, M.E., Chief Draftsman, Harrisburg Foundry and Machine Works. Residence: 225 North 2d Street, Harrisburg, Pa.

Archibald D. Morris, M.E., Bristol, Pa.

William Spencer Murray, E.E., Road Engineer, Construction Department, Westinghouse Electric and Mfg. Co., East Pittsburg, Pa. Residence: Amber Club.

Robert Neilson, C.E., Assistant Supervisor, Elmira and Canandaigua Division, N. C. Railway, Elmira, N. Y. Residence: 400 William Street.

James Harry Philips, C.E., Draftsman, Engineer Corps, Philadelphia Division, P. R. R., 32d St. and Powelton Ave., Philadelphia, Pa. Residence: 3217 Race Street.

Joseph Philips, jr., B.S., E.M. ('96), Mining Engineer for The Dahlonega Consolidated Gold Mining Co., Box 2, Dahlonega, Ga.

John Livingston Poultney, M.E., with the Southwark Foundry and Machine Co., Philadelphia, Pa. Residence: 1536 Pine Street.

Henry Crider Quigley, E.E., Manager for Ohio of The Security Trust and Life Insurance Co. of Philadelphia. Office: 1027 Garfield Building, Cleveland, O. Residence: 400 Franklin Avenue.

William Reinecke, jr., B.S. (in Architecture), Assistant Engineer, Charles Hegewald Co., New Albany, Ind. Residence: 954 5th Street, Louisville, Ky.

Eugene Jesse Rights, C.E., with the Engineering Department of the New York and Ottawa R. R. Company. Address: care of Rev. T. M. Rights, Moravian Town, Ontario, Canada.

Herbert Timothy Rights, C.E., Draftsman, Berlin Iron Bridge Co., East Berlin, Conn.

Samuel Neely Riter, M.E., Field Engineer for Riter-Conley Co., care of Manitoba Electric and Gas Light Co., Winnipeg, Manitoba. Permanent address: 56 Water Street, Pittsburg, Pa.

Eugene Schwinghammer, E.E., 409 Seventh St., S.W., Washington, D.C.

Henry Kent Seltzer, C.E., Instructor in Civil Engineering, University of Texas, Austin, Texas.

John Egbert Shero, A.C., Chemist, Pittsburg Reduction Co., Niagara Falls, N. Y. Residence: 239 Fifth Street.

Robert S. Siegel, B.A., Bethlehem, Pa.

Edwin Harrison Sigison, E.E., City Inspector of Public Lighting, Room 7, City Hall, Buffalo, N.Y. Residence: 57 Norwood Avenue.

John Blake Slack, E.E., Law Student, Mt. Holly, N.J.

Edwin George Steinmetz, E.E., Assistant Superintendent, The Electric Storage Battery Company, 19th Street and Allegheny Avenue, Philadelphia, Pa. Residence: 1609 North 15th Street.

John Eugene Stocker, B.S. (Sci.), Principal of High School, Bethlehem, Pa.

Robert Melvin Tarleton, B.S. (in Metallurgy), Mining Engineer, Denver, Col. Address: Denver Athletic Club.

Robert Sayre Taylor, B.S. (Sci.), Attorney-at-Law, First National Bank Building, Bethlehem, Pa.

Nathaniel Thurlow, A.C., Chemist, Ampere Electro-Chemical Co., Ampere, N. J. Residence: 10 Gould Avenue, Newark, N. J.

Charles Frederick Townsend, B.S. (in Architecture), Draftsman for Brown & Von Beren, Architects, Exchange Building, New Haven, Conn. Residence: 368 George Street.

Joseph Boyer Townsend, E.E., Construction Department, Consolidated Traction Co., *Times* Building, Pittsburg, Pa. Residence: 238 Virginia Ave.

John Frederick Van Benthem van den Bergh, C.E., Assistant Engineer, Madoera Railway, Bangkollon, Island of Madoera, Dutch East Indies.

Willard Randolph Van Liew, B.S. (in Metallurgy), Chemist, Electrolytic Refinery of Anaconda Copper Mining Co., Anaconda, Mont. Residence: The Montana.

Charles Henry Vansant, C.E., with William P. Field, C.E., 823 Prudential Building, Newark, N. J.

William Warr, E.E., General Superintendent for Pepper & Register, Contractors, 1414 S. Penn Square, Philadelphia, Pa. Residence: 436 North 34th Street.

Fred Irving Wheeler, C.E., Assistant on Fortification Construction at Plum Island, N.Y. Address: U. S. Engineer Office, New London, Conn.

Harry Amasa White, E.E., with White & Bro., Smelters and Dealers in Metals, 1505 E. Montgomery Avenue, Philadelphia, Pa. Residence: 1654 Vienna St.

John Crum Whitmoyer, E.E., Engineering Department, Westinghouse Electric & Manufacturing Co., East Pittsburg, Pa. Residence: 6800 Simen Street.

Edward Newton Wigfall, A.C., with William Waterall & Co., Philadelphia, Pa. Residence: 1822 Arch Street.

John Marion Wilson, C.E., Maintenance of Way Department, Pennsylvania R. R., Williamsport, Pa. Mailing address: Hillsboro, Md.

Harold Lawden Wood, A.C., Upper Montclair, N.J.

Carlos Yglesias, B.S., E.M.('96), San José, Costa Rica.

CLASS OF 1896.

William James Adams, jr., E.E., with the General Electric Co., Schenectady, N.Y. Residence: 212 Union Street.

William Stewart Ayars, M.E., Senior Third Assistant Engineer, U. S. M. S. "New York," American Line. Permanent address: 82 Dana Street, Wilkes-Barre, Pa.

Hobart Bentley Ayers, M.E., Inspector, Schenectady Locomotive Works, 621 Union Street, Schenectady, N.Y.

Albert Doane Ayres, C.E., taking course in Shopwork at E. P. Allis Shops, Milwaukee, Wis.

Arthur Davison Badgley, E.E., with the General Electric Co., Schenectady, N.Y. Residence: 208 Liberty Street.

Francis Hoskins Baldwin, E.E., 316 Consolidated Exchange Building, 60 Broadway, New York City. Residence: 260 Crown Street, New Haven, Conn.

Hasell Wilson Baldwin, M.E., care of Milton Car Works, Milton, Pa.

L. Warrington Baldwin, C.E., Civil Engineer with the Illinois Central R.R., Fort Dodge, Iowa.

Springfield Baldwin, C.E., Draftsman, Ramapo Iron Works, Hillburn, N.Y. Address: P. O. Box 45.

George Pomeroy Bartholomew, B.S. (in Metallurgy), with Rand Gold Mining Co., Johannesburg, South African Republic.

Frederic Rawdon Bartles, C.E., Rodman P. & E. R. R., Eastern Division, Williamsport, Pa, Residence: 955 West Fourth Street.

Charles C. W. Bauder, E.E., New York Telephone Co., 129 East 124th Street, New York City. Residence: 154 West 123d Street.

Fairfax Bayard, C.E., Assistant Examiner, U. S. Patent Office, Washington, D.C. Residence: 1908 3d Street, N.W.

Herbert Huebener Beck, A.C., Chemist, C. T. Miller Soap Works, Lancaster, Pa. Residence: 105 South Queen Street.

Edgar Tweedy Belden, C.E., Nazareth, Pa.

Moriz Bernstein, C.E., employed on Nicaragua Canal Survey. Address: 1214 North 2d Street, Philadelphia, Pa.

Warren Joshua Bieber, B.A., Instructor, Lehigh Preparatory School, Bethlehem, Pa. Residence: 25 N. Linden Street.

Daniel William Bliem, C.E., Assistant to Engineer of Bridges, B. & O. R. R., Mount Royal Station, Baltimore, Md. Residence: 203 Orbison Avenue, Roland Park.

Benjamin Franklin Bossert, C.E., Phoenix Bridge Co., Phoenixville, Pa.

Howard Franklin Boyer, B.S. (Sci.), with Laflin & Rand Powder Co., Wayne, Pa.

Edward Elisha Bratton, C.E., with Detroit Bridge and Iron Co., Detroit, Mich. Residence: 133 Park Street.

Frank Shepard Bromer, M.E., Apprentice, L.V.R.R. Shops, Easton, Pa. Residence; 234 Bushkill Street.

Maximilian Joseph Bucher, A.C., with W. J. Matheson & Co., Limited, 182 Front Street, New York City.

George Amandus Buvinger, M.E., with Pasteur-Chamberland Filter Co., Dayton, O. Residence: 29 Marshall Street.

Aaron Beaumont Carpenter, E.E., Avondale, Pa.

Malcolm Carrington, E.E., Inspector, Richmond Railway and Electric Co., Richmond, Va. Address: 1316 Grove Avenue.

Frank Leslie Cooke, E.E., with New York Telephone Co., 874 Broadway, New York City.

Eckley Samuel Cunningham, M.E., Mechanical Engineer, with the Anaconda Copper Mining Co., Anaconda, Mont.

Samuel Philip Curtis, M.E., Manager, Front Street Works, The Newark Gas Co., 26 Front Street, Newark, N.J.

Frederic Allyn Daboll, C.E., 322 East 6th Street, Plainfield, N. J.

John William Dalman, M.E., Assistant Road Foreman of Engines, L. V. R. R., 234 Bushkill Street, Easton, Pa.

Samuel Moses Dessauer, B.S. (in Architecture), Chief Engineer's Office, L. V. R. R. Co., South Bethlehem, Pa. Residence: 501 West 4th Street.

William Carter Dickerman, M.E., Purchasing Agent, Milton Car Works, Milton, Pa. Residence: 541 Broadway.

Frank Oliver Dufour, C.E., Instructor in Civil Engineering, Lehigh University, South Bethlehem, Pa. Residence: 523 Cherokee Street.

Edward Miall Durham, jr., C.E., with the U. S. Deep Waterways Commission, Cohoes, N. Y.

Edward Hiram Dutcher, jr., M.E., Foreman of Factory, The Corcoran Windmills, Pumps, Tanks, and Fixtures, Jersey Avenue and 13th Street, Jersey City, N. J.

Timothy Sharpe Eden, E.E., Draftsman, General Electric Co., Schenectady, N. Y. Residence: 208 Liberty Street.

George Ramsey Enscoe, C.E., Estimater for Shiffler Bridge Co., Pittsburg, Pa. Home address: 57 Lincoln Avenue, Bennett, Pa.

William Alvin Evans, B.S. (in Metallurgy), Summit Hill, Pa.

Charles Victor Ferriday, M.E., Draftsman, St. Anthony Falls Water Power Co., Minneapolis, Minn. Residence: 610 Eighth Street, South Minneapolis.

Curtis Bertram Flory, E.E., Drawing Office, Dickson Mfg. Co., Scranton, Pa. Residence: 1308 N. Washington Avenue.

Clarence Richard Fountain, E.E., Draftsman, Baldwin Locomotive Works, Philadelphia, Pa. Residence: 1316 Green Street.

Thomas Joseph Gannon, M.E., with American Lithograph Co., 4th Avenue and 19th Street, New York City. Residence: The Vendome, 363 Grand Avenue.

James Brown Given, E.E., Cashier, Citizens' Bank of Ponca City, Ponca City, Oklahoma Ty.

*John Savage Graff, E.E.

William Heald Groverman, M.E., Machinist Apprentice, C. & O. Ry., Huntington, W. Va. Residence: 925 Sixth Avenue.

David Hall, E.E., Purchasing Agent, Bullock Electrical Manufacturing Co., 1032 Broadway, Cincinnati, O.

Henry Neff Herr, C.E., Civil Engineer, 108 East King Street, Lancaster, Pa.

Howard Drysdale Hess, M.E., with the Pencoyd Iron Works, Pencoyd, Pa. Residence: 1829 Master Street, Philadelphia, Pa.

Robert Parsons Howell, C.E., Assistant Civil Engineer, Atlas Cement Co., Northampton, Pa.

William Steell Jackson, E.E., Fourth Assistant Examiner, U. S. Patent Office, Washington, D. C. Residence: 325 Spruce Street, N.W.

Victor Albert Johnson, B.S. (in Metallurgy), Mine Owner, Kaslo, British Columbia.

Victor Witmer Kline, C.E., Inspector of Construction, Department of Public Works, State of New York, stationed at Smith's Basin, N.Y. Permanent address: Box 1151, Lockport, N.Y.

Robert Edwin Kresge, A.C., Second Assistant Chemist, Bethlehem Iron Co., South Bethlehem, Pa.

Robert Edward Laramy, B.A., Instructor, Senior Department Moravian Parochial School, Bethlehem, Pa. Residence: 81 Broad Street.

Bruce Emerson Loomis, E.E., Manager, N. Y. and N. J. Telephone Co., W. New Brighton, Staten Island, N.Y.

Wheeler Lord, M.E., with Pennsylvania Bolt and Nut Co., Lebanon, Pa.

John Buckley McBride, C.E., Civil Engineer and Surveyor, Deckertown, N. J.

Clifford Sherron MacCalla, E.E., Construction Foreman, Edison Electric Illuminating Co., 360 Pearl Street, Brooklyn, N. Y. Residence: 11 St. James Place.

* Deceased.

Victor Emanuel Masson, A.C., Chemist to the Pleasant Valley Wine Co., Rheims, N.Y. Home address: Hammondsport.

Edward Williamson Miller, B.S., E.M. ('97), Chemist, New Jersey Zinc Co., Passaic Avenue, Newark, N. J. Residence: 207 Summer Street.

Rafael de la Mora, M.E., Ingeniero Mechanico y Contratista, of the firm of Mora y Lopez de Lara, Calle de San Francisco No. 17½, Guadalajara, Mexico.

Charles Howard Morgan, E.E., Patent Examiner, U. S. Patent Office, Washington, D.C. Residence: 325 Spruce Street.

William Hitz Mussey, E.E., Draftsman, Baldwin Locomotive Works, 500 North Broad St., Philadelphia, Pa.

John Henry Myers, C.E., Lewistown, Pa.

Franklin Oberly, E.E., Easton, Pa.

Walter Raleigh Okeson, C.E., Engineer, South Penn Oil Co., Mannington, W. Va.

Louis Atwell Olney, A.C., Professor of Chemistry and Dyeing, Lowell Textile School, Lowell, Mass.

Horace Lucius Palmer, C.E., U. S. Surveyor on U. S. Geological Survey in Indian Territory. Address: Denison, Texas.

Jacob Grafius Petrikin, B.S. (in Architecture), Lock Haven, Pa.

Morris Wright Pool, M.E., 234 West 52d Street, New York City.

James Lee Rankin, jr., M.E., Draftsman, 33d Street Mill, Carnegie Steel Co., Limited, Pittsburg, Pa. Residence: 334 S. Highland Avenue.

Henry Paul Reed, E.E., care of Lieut. H. A. Reed, War Department, Washington, D. C.

Homer Austin Reid, C.E., with the Youngstown Bridge Co., Youngstown, O. Mailing address: 111 North Chestnut Street, Warren, O.

George Homer Ruggles, C.E., Engineer Corps, Illinois Central R. R., Belleville, Ill.

Clement Clarence Rutter, C.E., Assistant Engineer, Monongah Coal and Coke Co., Monongah, W. Va.

John Cornelius Sesser, C.E., Assistant Engineer, C. & N. W. Ry., Boone, Ia.

*Arthur Yeager Shepherd, M.E.

Luther D. Showalter, C.E., Pottstown, Pa.

Henry Shriver, M.E., Superintendent, Union Mines, Mt. Savage, Md. Residence: 77 Washington Street.

Edward Stewart Taylor, M.E., Draftsman, Fort Wayne Electric Corporation, Fort Wayne, Ind. Residence: 407 Fairfield Avenue.

William Bailey Taylor, E.E., Testing Department, General Electric Co., Schenectady, N.Y.

John Augustus Thomson, B.S., E.M. ('97), with The Mazapil Copper Co., Limited, Concepcion del Oro, *via* Laredo and Santillo, Zacatecas, Mexico.

Edward Coppée Thurston, B.S. (in Metallurgy), Engineer, Robinson Deep Mining Co., Johannesburg, South African Republic.

Joseph Wharton Thurston, B.A., Bethlehem Iron Co., South Bethlehem, Pa. Residence: 311 Cherokee Street.

Curtis Edwards Trafton, E.E., with E. H. B. Brow & Co., Cotton Commission Merchants, 42 Bedford Street, Fall River, Mass.

Harry Conklin Tripp, M.E., Mechanical Engineer, with American Stoker Co., 141 Broadway, New York City. Residence: 142 Montague Street, Brooklyn, N.Y.

John Scofield Wallace, B.S. (in Metallurgy), Constructing Engineer, Shenango Valley Steel Co., New Castle, Pa. Residence: 68 N. Jefferson Street.

Ulysses Grant S. Walters, C.E., Pottstown, Pa.

Harry Dallam Webster, M.E., Draftsman, Dickson Locomotive Works, Scranton, Pa. Residence: 636 Adams Ave.

Frank Thomas Weiler, C.E., U. S. Engineer's Office, Philadelphia, Pa. Residence: 2416 Master Street.

Davis Sanno Williams, B.S. (in Architecture), Fort Snelling, Minn.

David William Wilson, jr., B.S. (in Architecture), with Charles C. Haight, Architect, 111 Broadway, New York City. Residence: 381 Greene Avenue, Brooklyn.

* Deceased.

J. Roberts Wilson, E.E., Construction Department, New York Telephone Co., 32 Gold Street, New York City. Residence: 120 East 28th Street.

Alfred Mahlon Worstall, E.E., of A.M. Worstall & Co., Contracting Engineers, Witherspoon Building, Philadelphia, Pa.

CLASS OF 1897.

Francis Dupont Ammen, M.E., Draftsman, Rand Drill Co., Tarrytown, N. Y. Residence: 22 College Place.

Henry Jonathan Biddle Baird, B.S. (in Metallurgy), with the Orford Copper Co., Constable Hook, N. J.

Lathrop Hutchings Baldwin, M.E., with the Vermont Marble Co., Proctor, Vt.

Charles Marshall Barton, C.E., Supervisor, L. V. R. R., Rochester, N. Y.

Harry Layfield Bell, E.E., with The Augusta Telephone and Electric Co., Augusta, Ga. Residence: 951 Broad St.

William Ragan Binkley, E.E., Manager, Amsterdam Automatic Telephone Co., 52 Market St., Amsterdam, N. Y.

Bertine Frederic Borhek, A.C., Chemist for Somerset Chemical Co., Bound Brook, N. J.

Charles Schwartze Bowers, E.E., with J. F. Buchanan & Co., Electrical Contractors, Philadelphia, Pa. Residence: 1606 North 15th Street.

John Boyt, B.S., E.M. ('98), Instructor in Mining and Metallurgy, Lehigh University. Residence: 431 Cherokee Street, South Bethlehem, Pa.

William Burke Brady, M.E., Line Department, Brooklyn Heights R. R. Co., Brooklyn, N.Y. Residence: 136 Herkimer Street.

Walter Everette Brown, E.E., Stamford, Conn.

Sinclair Wiggins Chiles, C.E., with the Engineering Contract Company of New York at Ottawa, Ontario, Canada. P. O. Address: Box 22, Hull, P. Q.

Thomas Holland Clagett, B.S. (in Metallurgy), with S. M. Taylor, Mining Engineer, *Chronicle-Telegraph* Building, Pittsburg, Pa.

Barton Olmsted Curtis, C.E., Engineering Department, Philadelphia, Wilmington & Baltimore R. R., 216 Washington Street, Media, Pa.

Patrick Edward Dinan, A.C., Chemist, Alpha Portland Cement Works, Whitaker, N.J. Residence: 230 East 3d Street, South Bethlehem, Pa.

Louis Diven, E.E., with the La France Fire Engine Co., Elmira, N.Y. Residence: 957 Lake Street.

Benjamin Irvin Drake, B.S. (in Metallurgy), Manager Eynon-Evans Manufacturing Co., 107 Liberty St., New York City. Residence: 821 Second Place, Plainfield, N. J.

Clifford George Dunnells, C.E., Engineering Department, Pittsburg Bridge Co., 38th Street and A. V. R. R., Pittsburg, Pa.

Stuart Rhett Elliott, B.S. (in Metallurgy), Assistant Mining Engineer, The Cleveland-Cliffs Iron Co., Ishpeming, Mich.

Albert Andrew Finkh, M.E., 214 Woodworth Avenue, Yonkers, N.Y.

Ira D. Fulmer, E.E., Graduate Student, Princeton University. Residence: 148 Nassau Street, Princeton, N.J.

Francisco Martinez Gallardo, M.E., C.E. ('98), 17 Santuario Street, Guadalajara, Mexico.

Orrin Satterlee Good, E.E., Construction Department, Standard Underground Cable Co. of Pittsburg, 32 W. Georgia Street, Indianapolis, Ind.

Ralph Scofield Griswold, E.E., Draftsman, General Electric Co., Schenectady, N.Y. Residence: 208 Liberty Street.

William Thomas Hanly, C.E., with the Assistant Engineer, Maintenance of Way Department, P. R. R., Philadelphia, Pa. Residence: 224 North 21st Street.

William Stephen Hiester, E.E., Electrical Engineer, with Edison Electrical Co., Philadelphia, Pa. Residence: 1935 North 13th Street.

Ross Nathaniel Hood, E.E., Duncannon, Pa.

Henry Taylor Irwin, M.E., Rosedale Foundry Co., Allegheny, Pa. Residence: 15 North Avenue.

Arthur Perkins Jenks, E.E., Testing Department, General Electric Company, Schenectady, N.Y. Residence: 29 Front Street.

Harry Sackett Johnson, E.E., Electrician in charge of plant of Niagara Falls Power Co. at Pittsburg Reduction Company's Works, Niagara Falls, N.Y. Residence: 264 Third Street.

Henry Harrison Jones, C.E., Civil Engineer, 846 Centre Avenue, Reading, Pa.

Lawrence Rust Lee, M.E., Engineer, with the Nicaragua Canal Commission. Residence: 1307 Corcoran Street, Washington, D.C.

Telford Lewis, B.S. (in Metallurgy), with the Cambria Iron Co., Johnstown, Pa. Address: 124 Market Street.

Charles Victor Livingston, E.E., with the General Electric Co., Schenectady, N. Y. Residence: 7 State Street.

Arthur Frost Loomis, E.E., with the New York Telephone Co., 138 Spring Street, New York City. Residence: 107 West 105th Street.

Barry MacNutt, E.E., M.S. ('98), Assistant Inspector, U. S. Army Office, Bethlehem Iron Works. Residence: 27 South Linden Street, Bethlehem, Pa.

James Gordon Mason, B.S. (in Metallurgy), with Lehigh Valley Coal Co., Wilkes-Barre, Pa. Residence: West Pittston, Pa.

William Adams Megraw, M.E., Electrical Subway Commission, City Hall Annex, Baltimore, Md. Residence: 1625 Eutaw Place.

Esteban A. Mercenario, C.E., Corazon de Jesus No. 18, City of Mexico, Mexico.

Thaddeus Merriman, C.E., Transitman, Nicaragua Canal Commission, Washington, D.C. Permanent address: South Bethlehem, Pa.

Frank Douglass Mount, C.E., care of Ashmead & Hackney, Civil Engineers and Surveyors, Room 42, Real Estate and Law Building, Atlantic City, N. J.

Carl Pivany Nachod, E.E., Laboratory, Electro-Dynamic Co., 224 Ionic Street, Philadelphia, Pa. Residence: 706 South Washington Square.

Henry H. Newton, M.E., 49 Carmen Street, Guadalajara, Mexico.

Robert Collyer Noerr, C.E., Draftsman, The Berlin Iron Bridge Co., East Berlin, Conn.

Harry Richards Peck, M.E., Draftsman, Dickson Locomotive Works, Scranton, Pa. Residence: 1523 Price Street.

James Harkins Pennington, M.E., Assistant Mechanical Engineer, Delaware, Susquehanna & Schuylkill R. R., Coxe Iron Mfg. Co., Cross Creek Coal Co., Drifton, Pa.

Morris Havens Putnam, M.E., Assistant Inspector of Ordnance, U. S. A., Lake Erie Engineering Works, Buffalo, N. Y. Residence: 321 West Utica Street.

John Peake Reynolds, jr., M.E., Draftsman, Maxwell Wyeth & Co., (Gas Engines), 65 Delevan Street, Brooklyn, N. Y. Residence: 404 Quincy Street.

Samuel Stewart Riegel, M.E., with The Baldwin Locomotive Works, Philadelphia, Pa. Residence: 1616 Mt. Vernon Street.

Eugene Peronnean Roundey, C.E., with W. S. Bacot, C.E., 1 Broadway, New York City. Residence: 100 West 85th Street.

Woodford Royce, M.E., Draftsman with The Pope Tube Co., Hartford, Conn.

Auguste Leopold Saltzman, M.E., with The Walter Scott Printing Machine Company, Plainfield, N. J.

Charles Fred. Sanders, C.E., Kutztown, Pa.

Charles Francis Scott, E.E., with the New York and Staten Island Electric Co., New York City. Residence: New Rochelle, N. Y.

Henry Hamilton Seabrook, E.E., Electrician for Waldorf-Astoria Hotel, New York City. Residence: 345 West 56th Street.

Samuel Palmer Senior, C.E., with Sooysmith & Company, Consulting and Contracting Engineers, 15 Broad Street, New York City. Residence: 479 West 152d Street.

Arthur Harold Serrell, E.E., with the Wheeler Condenser and Engineering Co., Carteret, N. J. Residence: 36 Myrtle Avenue, Plainfield, N. J.

Frank Bradley Sheaffer, C.E., with R. A. Wentworth, Resident Engineer, A. & W. Ry., Dayton, Pa.

John Leefe Sheppard, jr., M.E., with Thorburn Reid, Consulting Engineer, 120 Liberty Street, New York City. Residence: 47 West 16th Street.

Edward Peter Shuman, C.E., with American Lake Superior Power Co., Sault Ste. Marie, Mich.

Jonathan Edward Slade, C.E., 292 Ohio Street, Chicago, Ill.

Francis Betts Smith, M.E., Manager, Burdette Rountre Mfg. Co., 120 Liberty Street, New York City. Residence: 60 Clark Street, Brooklyn, N.Y.

Harvey Wilson Sprague, M.E., Draftsman, Bethlehem Foundry and Machine Co., South Bethlehem, Pa.

Michael Thomas Stack, C.E., Engineering Corps, L. V. Coal Co., Lost Creek, Pa. Residence: 314 East Centre Street, Shenandoah, Pa.

Alvin Riegel Sterner, E.E., with the Strowger Automatic Telephone Exchange Co., 947–949 Rookery Building, Chicago, Ill.

John Stewart, jr., B.S. (in Mining), Mining Engineer for The Berwind-White Coal Mining Co., Herminie, Westmoreland Co., Pa.

Paul Beno Straub, E.E., Electrical Engineer, Fort Pitt Bridge Works, Canonsburg, Pa. Residence: 4921 Forbes Street, Shady Side, Pittsburg, Pa.

Thomas Cedwyn Thomas, B.S., E.M. ('98), Mining Engineer and Assistant Metallurgist, Mazapil Copper Co., Limited, Concepcion del Oro, *via* Saltillo and Laredo, Zacatecas, Mexico.

Wallace Treichler, C.E., with J. A. Harman, Peoria, Ill. Residence: Rock Island House, Rock Island, Ill.

William Edward Underwood, M.E., with F. R. Dravo & Co., Engineers and Contractors, Lewis Block, Pittsburg, Pa.

Harrison Ricord Van Duyne, E.E., City Engineer's Office, Newark, N.J. Residence: 350 Summer Avenue.

Charles Parker Wagoner, C.E., Phoenixville, Pa.

John Eugene Weideman, E.E., Washington, D. C.

Gilbert Case White, C.E., with the Chesapeake and Ohio R. R. Address: 1 Clay Street, Richmond, Va.

George Livingston Yates, E.E., with New York Telephone Co., 15 Dey Street, New York City. Residence: 318 West 57th Street.

Ambrose Everett Yohn, M.E., with the Huntingdon and Broad Top Mountain Railroad and Coal Co. Residence: Saxton, Pa.

Frank Steinmetz Young, B.S., E.M. ('98), Chemist for American Magnesia Co., Plymouth Meeting, Pa.

CLASS OF 1898.

Harry Leigh Adams, C.E., with The New York Telephone Co., 15 Dey Street, New York City.

Alanson Quigley Bailey, B.A., Student, General Theological Seminary, Chelsea Square, New York City.

Junius Ballard, M.E., Louisburg, N.C.

Alejandro Barrientos, C.E., Civil Engineer, employed by U. S. Government, Santiago de Cuba. Residence: St. Lucia, 47.

Frank Breckenridge Bell, M.E., Mercer, Pa.

Henry David Bishop, M.E., with the Bethlehem Iron Co., Bethlehem, Pa. Residence: 20 Wall Street.

Henry Theodore Borhek, B.S. (in Metallurgy), Graduate Student, Lehigh University. Residence: 508 Goepp Street, Bethlehem, Pa.

Daniel John Broughal, A.C., South Bethlehem, Pa.

Horatio Francis Brown, M.E., with Baltimore & Ohio R.R. Co. (Mt. Clare Shops). Residence: 1127 St. Paul Street, Baltimore, Md.

Paul Bucher, E.E., 55 North 40th Street, Philadelphia, Pa.

David Hope Childs, B.S. (in Metallurgy), Mazapil Copper Co., Limited, Concepcion del Oro, Zacatecas, (*via* Laredo and Saltillo), Mexico.

Herbert Myron Daggett, E.E., with J. F. Buchanan & Co., Electrical Engineers and Contractors, Bourse Building, Philadelphia, Pa. Residence: 129 North 20th Street.

George Davies, M.E., Graduate Student, Lehigh University. Residence: Catasauqua, Pa.

William Adam Dehm, C.E., with the D. & H. Canal Co., D. & H. C. Co. Depot, Scranton, Pa. Residence: 176 South Franklin Street, Wilkes-Barre, Pa.

Charles Meirs Denise, B.S. (Rutgers), C.E., with the Lehigh Engineering Co., Allentown, Pa. Residence: 131 South 4th Street.

John Jacob Eckfeldt, M.E., with F. R. Dravo & Co., Engineers and Contractors, 812 Lewis Block, Pittsburg, Pa. Residence: 119 Arch Street, Allegheny, Pa.

Linden Erle Edgar, M.E., Draftsman, Link Belt Engineering Co., Nicetown, Pa. Residence: 223 West Tulpehocken Street, Germantown.

Edgar Davis Edmondston, E.E., with the United States Electric Lighting Co., Washington, D.C. Residence: 1220 Massachusetts Avenue.

Edgar Raymond Frisby, C.E., Aid, U. S. Coast and Geodetic Survey. Residence: 1607 31st Street, Washington, D. C.

Willard Boyer Fuller, M.E., 335 Bridge Street, Catasauqua, Pa.

José Maria Garza Galán, B.S. (in Metallurgy), Graduate Student, Lehigh University. Home address: 21 Victoria Street, Saltillo, Coahuila, Mexico.

Robert Edward Lee George, E.E., with the Baltimore Consolidated Street Railway Co., Baltimore, Md. Residence: 116 West North Avenue.

William Gratz, E.E., with Quaker City Electric Co., Philadelphia, Pa. Residence: 214 Broadway, Camden, N.J.

Frank Hammond Gunsolus, C.E., late First Lieutenant, 49th Iowa Regiment, U. S. V. Engineering Corps, P. R.R., 32d St. and Powelton Ave., Philadelphia, Pa. Residence: 3217 Race Street.

Wentworth Greene Hare, M.E., Machine Shop of The Pusey and Jones Co., Wilmington, Del.

Raymond Hazel, E.E., Cressona, Pa.

Henry Bruner Hershey, E.E., Draftsman and Computer of Special Work, Frog, Switch, and Signal Department, Pennsylvania Steel Co., Steelton, Pa. Residence: 324 Pine Street.

Herbert Henninger Hess, E.E., Testing Department, Crocker and Wheeler Electric Co., Ampere, N. J. Residence: 275 Sixth Avenue, Newark, N. J.

Edward Darling Hillman, M.E., Assistant Engineer, Herendeen Mfg. Co., Geneva, N. Y.

Harold John Horn, E.E., Electrical Engineer, with J. A. Roebling's Sons Co., Trenton, N. J. Residence: 36 W. State Street.

Leonard Sherman Horner, E.E., Electrical Engineer, 29 East 21st Street, New York City.

Frank Norman Kneas, C.E., Draftsman, Pencoyd Iron Works, Pencoyd, Pa. Residence: Norristown, Pa.

Basil George Kodjbanoff, M.E., representing Franklin B. Yates, Saratoga Lincoln Spring and Carbonic Acid Gas, 48 Maiden Lane, New York City.

Jacob B. Krause, B.A., Principal of Public Schools, Madison Building, South Bethlehem, Pa.

Thomas H. Lawrence, E.E., Traffic Department, New York Telephone Co., 18 Cortlandt Street, New York City. Residence: 318 West 57th Street.

John Brown Lindsey, jr., C.E., Assistant Engineer, Alabama and Florida R. R., River Falls, Ala.

Clarence Albert Loomis, C.E., Civil Engineer, Inspector for Lake Superior Power Co., Sault Ste. Marie, Mich.

Lee Holmes Marshall, M.E., with Marshall Bros., Elevator Builders, Diamond Street, Pittsburg, Pa. Residence: 814 Lilac St., E.E.

*Charles Francis Moritz, E.E.

José Aristides de Obaldia, C.E., 895 Avenida Bolivar, David, Panama, Rep. Col.

John O'Reilly, A.C., South Bethlehem, Pa.

Howard Charles Paddock, C.E., Draftsman for The New England Structural Co., Everett, Mass.

* Deceased.

Frederick Allen Perley, C.E., 309 Campbell Street, Williamsport, Pa.

Carroll Winston Quarrier, M.E., Draftsman, with Julian Kennedy, M.E., Pittsburg, Pa. Residence: Crofton, Pa.

Victor Clinton Records, C.E., 500 Central Avenue, Laurel, Del.

Percy Lawrence Reed, C.E., Graduate Student, Lehigh University, South Bethlehem, Pa. Residence: 732 Cherokee Street.

Benjamin DeWitt Riegel, M.E., with John L. Riegel & Son, Riegelsville, N. J.

D'Arcy Wentworth Roper, M.E., with the Buffalo Forge Co., Buffalo, N. Y. Residence: 254 Franklin Street.

Rafael Francisco Sanchez, B.S. (in Metallurgy), Graduate Student, Lehigh University, South Bethlehem, Pa. Residence: Gibara, Cuba.

Henry Cord Schwecke, E.E., Electrician, Pine Forest Inn, Summerville, S. C.

Daniel Franklin B. Shepp, C.E., Tamaqua, Pa.

B. Roland Smoot, A.C., Chemist, Grand Central Mining Co., Robinson, Juab Co., Utah. Residence: Hotel Mammoth.

Lewis Cheston Starkey, M.E., Principal of Maple Grove School, Byberry, Philadelphia, Pa. Residence: Bustleton, Pa.

James Willis Stauffer, C.E., Office of Division Engineer, L. V. R. R., Easton, Pa. Residence: 517 Pawnee St., South Bethlehem, Pa.

Martin Shaaff Stockett, B.A., Student, General Theological Seminary, New York City. Residence: Ninth Avenue and Twentieth Street.

E. Harrison Symington, M.E., with the L. V. R. R., South Easton, Pa. Residence: 317 Bushkill Street.

Edward Hileman Waring, M.E., with the Crocker-Wheeler Electric Light Co., Ampere, N. J. Residence: 220 Springdale Avenue, East Orange, N. J.

Charles Bartlett Warren, M.E., with the W. Warren Thread Works, Westfield, Mass. Residence: 83 Broad Street.

Levi Watts, jr., E.E., Terre Hill, Pa.

Henry Storrs Webb, B.S. (M.I.T.), M.S., Instructor in Electrical Engineering, Lehigh University. Residence: 411 Cherokee Street, South Bethlehem, Pa.

Charles Edward Webster, jr., B.A., Student, College of Physicians and Surgeons, 59th Street, New York City. Residence: 36 West 61st Street.

Theodore Benjamin Wood, M.E., with Omaha Gas Co., 2716 Howard Street, Omaha, Neb.

Lawrence Wooden, C.E., Hampstead, Md.

Warren Worthington, M.E., Graduate Student, Lehigh University, South Bethlehem, Pa. Home address: Rushland, Pa.

Samuel Augustus Yorks, jr., E.E., with the New York Telephone Co., 15 Dey Street, New York City. Residence: 154 Henry Street, Brooklyn.

Harry Bernard Zimmele, A.C., Chemist, Oakland Chemical Co., 465 West Broadway, New York City.

Harry Statten Zimmerman, C.E., Assistant to Division Engineer, Chicago and Erie Division, Erie R. R., Huntington, Ind.

The number of graduates is 1028, degrees having been conferred as follows:

Upon graduates of the School of General Literature: B.A., 51; B.S., 22; Ph.B., 7; M.A., 9.

Upon graduates of the School of Technology: C.E., 360; M.E., 216; B.M., 19; B.S. (in Mining and Metallurgy), 96; E.M., 77; E.E., 139; A.C., 95; B.S. (in Architecture), 13; M.S., 6; Ph. D., 2.

Of these, 9 have taken the degrees of B.A. and M.A.; 2 of B.S. and C.E.; 1 of B.S. and A.C.; 11 of B.M. and E.M.; 43 of B.S. and E.M.; 1 of B.S., B.M., and E.M.; 1 of B.M., E.M., and A.C.; 1 of B.S., E.M., and C.E.; 1 of C.E. and E.M.; 2 of A.C. and E.M.; 1 of M.E. and C.E.; 1 of E.E. and M.S.; 1 of A.C. and M.S.; 1 of B.S., E.M., and M.S.; 2 of A.C., M.S., and Ph. D. 981 graduates are still living.

ONE-YEAR COURSE IN ELECTRICITY.

Beginning with the year 1884-85, the University offered a special course in Electricity, covering one year's work. Those who completed this course received certificates but no degrees. In 1888, the full four-year course in Physics and Electrical Engineering, leading to the degree of E.E., was established, and the one-year course was withdrawn. The names of those who completed this course are not included in the Roll of Alumni, but are here given:

Elmer Ellsworth Boyer, '85, Foreman of Testing Department, General Electric Co., Lynn, Mass.

Albert Brodhead, '88, 121 S. Centre Street, Bethlehem, Pa.

Edward Conner, '86, Philadelphia, Pa.

William Fairchild Dean, '88, Manager Montreal Office, Canadian General Electric Co., Ltd., 1802 Notre Dame Street, Montreal, Can. Residence: 1264 Dorchester St.

Horace Musser Engle, '85, (Economic Geology), Roanoke, Va.

Herman Frauenthal, '88, M.D., 214 E. 50th St., New York City.

Walter George Fuller, '87, Brattleboro, Vermont.

John Wesley Hackney, '87, of the firm of Ashmead and Hackney, Civil Engineers and Surveyors, Room 42, Real Estate & Law Building, Atlantic City, N. J.

James Arthur Heaton, '86.

Richard Otto Albert Heinrich, '88, General Manager, European Weston Electrical Instrument Co., Ritterstrasse 88, Berlin, Germany.

William Hoopes, '86, Manager of Philadelphia office of The American Electrical and Maintenance Co., 44 North 4th Street, Philadelphia, Pa.

Joseph Allison Horner, '88.

William Henry Hubbard, '88, General Agent, Helios Electric Co., 1229 Callowhill St., Philadelphia, Pa.

Walter Eugene Hyer, '86, College of Physicians and Surgeons, New York City. Residence: 203 West 87th Street.

Daniel Henry Jenkins, '88, M.D., 1932 North Main Avenue, Scranton, Pa.

Charles Leavitt Jenness, '85, Secretary and Treasurer, The Avery & Jenness Co., 28 West Washington Street, Chicago, Ill.

William Sigler Jones, '87, Secretary, The Quaker City Electric Co,, 237–239 Dock Street, Philadelphia, Pa. Residence: 5144 Wayne Avenue.

George Herman Koehler, '85.

Robert McAllister Lloyd, '86, Electrical Engineer, 22 Broad Street, New York City.

Dion M. Martinez, jr., '87.

Charles Jacob Meade, '86, Edison Electric Illuminating Co., 48 W. 20th Street, New York City.

Charles Jacob Miller, '88, General Agent, New York Heat, Light and Power Co., 33–43 Gold Street, New York City.

James Leidy Moore, '88, Superintendent, The Moorestown Electric Light, Heat and Power Co., Moorestown, N. J.

George Harrison Neilson, '86, Supervisor , Division No. 3, Philadelphia Div., P. R. R., Parkesburg, Pa.

Horace Fields Parshall, '87, Edison General Electric Co., Schenectady, N. Y.

George Herbert Putnam, '85, Principal, Educational Department, Kansas School for the Deaf, Olathe, Kansas.

Charles Norris Robinson, '88, with the Choctaw, Oklahoma & Gulf R. R., Girard Building, Philadelphia, Pa.

Harry Meyer Seitzinger, '88, Manager of Machine and Electrical Department, J. G. Seitzinger Screen and Machine Works, 6 Northampton St., Wilkes-Barre, Pa.

Arthur Douglas Spear, '87, Standard Carbon Co., Cleveland, O.

Lewis Buckley Stillwell, '85, Electrical Director, Cataract Construction Co. and Niagara Falls Power Co., Niagara Falls, N. Y.

Charles Wesley White, '88.

George Henry Wolle, '87, Superintendent Bethlehem Electric Light Co., Bethlehem, Pa.

Hugh Carlyle Young, '88, Superintendent Wellsboro Electric Company, Wellsboro, Tioga County, Pa.

OFFICERS OF THE ALUMNI ASSOCIATION OF THE LEHIGH UNIVERSITY, 1898-99.

President:

HOLBROOK FITZ JOHN PORTER, South Bethlehem, Pa.

Vice-Presidents:

WILLIAM BRADFORD, Pittsburg, Pa.
MATTHEW MCCLUNG, JR., Rankin, Pa.

Archivist:

EDWARD H. WILLIAMS, JR., Bethlehem, Pa.

Secretary and Treasurer:

HARRY H. STOEK, 809 Quincy Avenue, Scranton, Pa.

Honorary Alumni Trustees:

GARRETT B. LINDERMAN, South Bethlehem, Pa.
(Term expires June, 1899.)

W. ARTHUR LATHROP, Wilkes-Barre, Pa.
(Term expires June, 1900.)

FRANK P. HOWE, Philadelphia, Pa.
(Term expires June, 1901.)

THOMAS M. EYNON, Philadelphia, Pa.
(Term expires June, 1902.)

Executive Committee:

HOLBROOK FITZ JOHN PORTER, *Chairman*,

G. B. LINDERMAN,
W. A. LATHROP,
FRANK P. HOWE,
THOMAS M. EYNON,
WILLIAM BRADFORD,
MATTHEW MCCLUNG, JR.,
E. H. WILLIAMS, JR.,
HARRY H. STOEK.

ALPHABETICAL ALUMNI LIST.

A

H. L. Adams, '98.
W. J. Adams, jr., '96.
C. L. Addison, '88.
W. H. Allen, '85.
W. A. Allgaier, '94.
F. DuP. Ammen, '97.
F. F. Amsden, '87.
J. W. Anderson, '89.
W. C. Anderson, '94.
F. C. Angle, '76.
H. L. Arbenz, '95.
*L. P. Ashmead, '70.
W. N. R. Ashmead, '92.
*G. W. B. Asmussen, '92.
G. H. Atkins, '93.
*P. Atkinson, '89.
H. J. Atticks, '93.
H. L. Auchmuty, '85.
M. B. Augur, '91.
W. S. Ayars, '96.
H. B. Ayers, '96.
A. D. Ayres, '96.
C. T. Ayres, '95.
G. Ayres, '89.

B

*E. K. Bachman, '83.
A. D. Badgley, '96.
A. Q. Bailey, '98.
T. C. J. Baily, jr., '90.
H. J. B. Baird, '97.
R. L. Baird, '92.
F. Baker, jr., '95.
W. H. Baker, '73.
C. K. Baldwin, '95.
F. H. Baldwin, '96.
G. R. Baldwin, '88.
H. W. Baldwin, '96.
L. H. Baldwin, '97.
L. W. Baldwin, '96.
S. Baldwin, '96.
J. Ballard, '98.
C. L. Banks, '88.
H. C. Banks, '93.
N. C. Banks, '93.
A. F. Bannon, '95.
J. C. Barber, '95.
R. P. Barnard, '89.
J. N. Barr, '71.
J. Barrell, '92.
R. W. Barrell, '87.
F. R. Barrett, '90.
A. Barrientos, '98.
G. P. Bartholomew, '96.
R. J. Bartholomew, '95.
F. R. Bartles, '96.
C. M. Barton, '97.

* Deceased.

J. Y. Bassell, jr., '92.
J. N. Bastress, '92.
R. C. Bastress, '95.
A. H. Bates, '89.
E. A. Bates, '88.
G. W. S. Baton, '94.
C. C. W. Bauder, '96.
F. Bayard, '96.
H. W. Beach, '95.
W. D. Beatty, '88.
J. M. Beaumont, '92.
E. H. Beazell, '90.
C. J. Bechdolt, '75.
H. H. Beck, '96.
G. W. Beggs, '95.
I. I. Beinhower, '94.
E. T. Belden, '96.
F. B. Bell, '98.
H. L. Bell, '97.
S. E. Berger, '89.
M. Bernstein, '96.
J. H. Best, '95.
W. J. Bieber, '96.
W. R. Binkley, 97.
*T. W. Birney, '85.
H. D. Bishop, '98.
G. P. Bland, '72.
E. M. Blehl, '95.
H. R. Blickle, '93.
D. W. Bliem, '96.
W. W. Blunt, '92.
J. E. Boatrite, '91.
A. Bonnot, '87.
H. A. Bonzano, '88.
G. R. Booth, '86.
B. F. Borhek, '97.
H. T. Borhek, '98.
B. F. Bossert, '96.
C. S. Bowers, '97.
W. Bowie, '95.
H. L. Bowman, '85.
J W. Boyd, '91.
W. I. Boyd, '93.
H. F. Boyer, '96.
C. H. Boynton, '89.
J. Boyt, '97.
W. Bradford, '88.
W. B. Brady, '97.
W. Y. Brady, '92.
E. E. Bratton, '96.
F. E. Bray, '93.
T. J. Bray, jr., '94.
R. S. Breinig, '86.
C. S. Bricker, '95.
W. Briggs, '83.
L. C. Brink, '94.
R. B. Brinsmade, '95.
R. Brodhead, '70.
F. S. Bromer, '96.
J. E. Brooks, '95.
D. J. Broughal, '98.
E. C. Brown, '95.
H. F. Brown, '98.
J. H. Brown, '86.
R. B. Brown, '94.
W. E. Brown, '97.
W. H. Brown, '95.
W. T. Brown, '95.
A. T. Bruegel, '88.
A. Braner, '80.
D. P. Bruner, '72.
J. E. Bucher, '91.
M. J. Bucher, '96.
P. Bucher, '98.
C. A. Buck, '87.
J. B. Buckley, '91.

* Deceased.

J. C. Buckner, '87.
J. H. Budd, '95.
J. L. Budd, '89.
E. D. Buel, '94.
C. Bull, '78.
C. C. Burgess, '95.
O. C. Burkhardt, '88.
J. L. Burley, '94.
G. F. Burnett, '93.
C. N. Butler, '88.
H. A. Butler, '83.
W. R. Butler, '70.
G. A. Buvinger, '96.
M. L. Byers, '88.

C

J. T. Callaghan, jr., '95.
E. Campbell, '89.
A. M. Cañadas, '75.
A. Cardenas, '90.
F. J. Carman, '89.
W. C. Carnell, '94.
A. B. Carpenter, '96.
M. Carrington, '96.
T. F. Carroll, '94.
H. M. Carson, '89.
*J. DeW. Carson, '76.
C. M. Case, '92.
G. P. Case, '92.
F. L. Castleman, '95.
G. E. Chamberlain, '93.
E. Chao, '91.
H. W. Chester, '89.
R. E. Chetwood, jr., '95.
D. H. Childs, '98.
S. W. Chiles, '97.
T. H. Clagett, '97.
C. E. Clapp, '86.
J. J. Clark, '88.
R. B. Claxton, '73.
F. L. Clerc, '71.
W. P. Cleveland, '90.
A. S. Clift, '95.
F. R. Coates, '90.
G. H. Cobb, '86.
P. L. Cobb, '92.
F. A. Coleman, '92.
W. W. Coleman, '95.
W. J. Collier, '95.
G. P. Connard, '88.
F. L. Cooke, '96.
H. V. Cooke, '83.
M. L. Cooke, '95.
R. G. Cooke, '84.
W. H. Cooke, '85.
W. S. Cope, '90.
H. St. L. Coppée, '72.
*J. H. H. Corbin, '69.
W. Corbin, '89.
J. C. Cornelius, '89.
W. A. Cornelius, '89.
C. E. Coxe, '90.
E. H. Coxe, '91.
W. S. Cranz, '81.
H. M. Crawford, '95.
H. M. S. Cressman, '95.
W. F. Cressman, '93.
W. Cresson, '91.
A. P. Crilly, '81.
F. J. Crilly, '83.
J. B. Cullum, '90.
B. A. Cunningham, '87.
E. S. Cunningham, '96.
J. S. Cunningham, '79.

* Deceased.

B. O. Curtis, '97.
S. P. Curtis, '96.
S. D. Cushing, '92.

D

F. A. Daboll, '96.
H. M. Daggett, '98.
J. W. Dalman, '96.
F. W. Dalrymple, '83.
R. Daniels, '88.
G. Davies, '98.
G. H. Davis, '88.
H. H. Davis, '92.
J. R. Davis, '91.
M. Davis, jr., '92.
W. R. Davis, '92.
W. S. Davis, '88.
W. H. Dean, '86.
C. H. Deans, '89.
W. J. Dech, '93.
H. S. Deck, '95.
*F. R. C. Degenhart, '72.
W. A. Dehm, '98.
H. DeHuff, '95.
J. W. DeMoyer, '90.
C. M. Denise, '98.
H. Denman, '92.
S. M. Dessauer, '96.
*C. H. Detwiler, '90.
P. H. DeWitt, '88.
S. C. deWitt, '95.
J. C. Dick, '95.
W. C. Dickerman, '96.
C. E. Dickerson, jr., '89.
E. Diebitsch, '89.
P. E. Dinan, '97.
A. B. Diven, '94.
E. Diven, '87.
L. Diven, '97.
E. Dodge, '92.
M. V. Domenech, '88.
T. J. Donahoe, '83.
A. Doolittle, '87.
E. Doolittle, '91.
J. W. Dougherty, '89.
C. M. Douglas, '93.
H. B. Douglas, '84.
W. J. Douglas, '94.
B. I. Drake, '97.
F. R. Dravo, '87.
G. P. Dravo, '88.
R. M. Dravo, '89.
P. Drayton, '92.
H. S. Drinker, '71.
B. DuBarry, jr., '95.
G. F. Duck, '83.
F. O. Dufour, '96.
M. M. Duncan, '80.
C. G. Dunnells, '97.
W. S. Dunscomb, '94.
C. H. Durfee, '93.
E. M. Durham, jr., '96.
E. H. Dutcher, jr., '96.
E. H. DuVivier, '89.

E

J. Eagley, '77.
A. Eavenson, '91.
*H. S. Eckert, '92.
H. Eckfeldt, '95.
J. J. Eckfeldt, '98.
A. W. A. Eden, '95.
T. S. Eden, '96.
L. E. Edgar, '98.
E. D. Edmonston, '98.
W. N. Edson, '85.

* Deceased.

S. R. Elliott, '97.
T. P. Elmore, '94.
L. H. Ely, '92.
L. O. Emmerich, '82.
T. G. Empie, '94.
G. W. Engel, '92.
*J. R. Engelbert, '85.
B. Enright, '93.
G. R. Enscoe, '96.
J. de la C. Escobar, '91.
H. B. Evans, '93.
W. A. Evans, '96.
T. M. Eynon, '81.

F

E. L. Faison, jr., '95.
G. H. Farman, '95.
*W. D. Farwell, '89.
E. F. Fassitt, '71.
F. Faust, '94.
M. H. Fehnel, '87.
J. DuB. Ferguson, '94.
C. V. Ferriday, '96.
E. C. Ferriday, '95.
R. Ferriday, '94.
W. Ferris, '95.
C. E. Fink, '90.
F. W. Fink, '86.
A. A. Finkh, '97.
*F. E. Fisher, '90.
F. R. Fisher, '90.
H. S. Fisher, '87.
C. B. Flory, '96.
R. D. Floyd, '94.
C. W. Focht, '88.
H. A. Foering, '90.
W. B. Foote, '84.
A. E. Forstall, '83.
W. Forstall, '91.
C. R. Fountain, '96.
J. J. Frank, '94.
G. S. Franklin, '88.
H. W. Frauenthal, '89.
A. H. Frazier, '89.
K. Frazier, '87.
*T. W. Frederick, '76.
S. W. Frescoln, '88.
F. Freyhold, '85.
E. R. Frisby, '98.
G. H. Frost, '93.
F. P. Fuller, '93.
W. B. Fuller, '98.
I. D. Fulmer, '97.

G

*G. L. Gabrio, '95.
L. L. Gadd, '94.
R. F. Gadd, '93.
A. G. Galan, '95.
J. M. G. Galan, '98.
F. M. Gallardo, '97.
T. J. Gannon, '96.
L. P. Gaston, '88.
W. Gates, jr., '88.
C. W. Gearhart, '93.
R. E. L. George, '98.
E. A. Giberga y Galé, '95.
J. J. Gibson, '95.
P. D. Giess, '77.
*J. E. Gilbert, '78.
J. B. Given, '96.
T. Gjertsen, '92.
F. W. Glading, '94.
A. M. Glassel, '77.
*J. B. Glover, jr., '88.
E. G. Godshalk, '95.

* Deceased.

H. H. Godshall, '93.
N. O. Goldsmith, '83.
O. S. Good, '97.
R. Goodman, '90.
W. T. Goodnow, '83.
W. R. Goss, '95.
R. C. Gotwald, '86.
*J. S. Graff, '96.
M. B. Graff, '94.
S. L. Graham, '93.
F. L. Grammer, '89.
W. Gratz, '98.
C. W. Gray, '81.
G. E. Greene, '90.
W. Griffith, '76.
J. S. Griggs, jr., '91.
E. A. Grissinger, '94.
R. S. Griswold, '97.
L. J. H. Grossart, '86.
W. H. Groverman, '96.
*J. A. Gruver, '92.
F. H. Gunsolus, '98.
B. Guthrie, '94.

H

C. W. Haines, '74.
F. T. Haines, '95.
*H. S. Haines, '87.
J. F. Halbach, '75.
B. F. Haldeman, '81.
D. Hall, '96.
W. McC. Hall, '94.
F. D. Hallock, '94.
T. G. Hamilton, '95.
M. S. Hanauer, '86.
W. T. Hanly, '97.
H. Hardcastle, '88.
T. H. Hardcastle, '80.
W. G. Hare, '98.
H. W. Harley, '90.
H. T. Harper, '84.
G. W. Harris, '89.
L. S. Harris, '93.
G. A. Hart, '88.
W. D. Hartshorne, '74.
R. R. Harvey, '95.
S. J. Harwi, '86.
G. S. Hayes, '91.
C. S. Haynes, '93.
R. Hazel, '98.
S. C. Hazelton, '86.
W. C. Hazlett, '78.
R. W. Heard, '93.
D. G. Hearne, '90.
R. C. H. Heck, '93.
I. A. Heikes, '85.
J. S. Heilig, '91.
W. A. Heindle, '91.
G. M. Heller, '77.
L. Henderson, '89.
T. L. Henry, '95.
A. W. Henshaw, '94.
A. A. Herr, '74.
H. N. Herr, '96.
J. F. Hersh, '91.
H. B. Hershey, '98.
H. D. Hess, '96.
H. H. Hess, '98.
H. S. Hess, '95.
A. Y. Hesse, '94.
C. E. Hesse, '89.
H. V. Hesse, '91.
W. S. Hiester, '97.
I. M. Higbee, '95.
H. H. Hillegass, '84.
F. H. Hilliard, '94.

* Deceased.

E. D. Hillman, '98.
W. J. Hiss, jr., '95.
J. B. Hittell, '87.
J. D. Hoffman, '83.
E. F. Hofford, '84.
W. E. Holcombe, '94.
J. S. B. Hollinshead, '90.
M. H. Holz, '94.
P. D. Honeyman, '91.
R. B. Honeyman, '88.
G. G. Hood, '83.
R. N. Hood, '97.
J. T. Hoover, '91.
C. C. Hopkins, '82.
W. Hopkins, '95.
G. L. Hoppes, '83.
H. J. Horn, '98.
L. S. Horner, '98.
H. S. Houskeeper, '72.
F. K. Houston, '90.
J. M. Howard, '87.
F. P. Howe, '78.
M. A. DeW. Howe, jr., '86.
R. P. Howell, '96.
A. A. Howitz, '94.
C. W. Hudson, '89.
G. W. Hunsicker, '94.
G. C. Hutchinson, '94.

I

H. Ichikawa, '91.
D. W. Irvine, '95.
H. T. Irwin, '97.

J

W. S. Jackson, '96.
C. B. Jacobs, '95.
E. A. Jacoby, '95.
H. S. Jacoby, '77.
W. L. Jacoby, '92.
W. A. James, '95.
J. A. Jardine, '84.
H. S. Jaudon, '95.
S. H. Jencks, '88.
G. A. Jenkins, '70.
A. P. Jenks, '97.
A. B. Jessup, '95.
A. E. Jessup, '92.
J. T. Jeter, '80.
J. J. Jimenez, '92.
E. B. John, '95.
H. S. Johnson, '97.
V. A. Johnson, '96.
A. Johnston, '89.
A. B. Jones, '94.
B. H. Jones, '94.
C. C. Jones, '87.
H. H. Jones, '97.
A. E. Juhler, '91.
C. A. Junken, '86.

K

A. S. Kappella, '95.
D. Kautz, '95.
W. H. Kavanaugh, '94.
W. B. Keim, '95.
C. L. Keller, '93.
J. S. Kellogg, jr., '89.
J. W. Kellogg, '84.
H. Kemmerling, '91.
J. M. S. Kerlin, '89.
D. G. Kerr, '84.
W. J. Kerr, '70.
H. E. Kiefer, '92.
W. F. Kiesel, jr., '87.
C. F. King, '80.

* Deceased.

H. E. Kip, '95.
R. R. Kitchel, '92.
J. W. Kittrell, '87.
V. W. Kline, '96.
*L. E. Klotz, '72.
H. M. Knapp, '91.
F. N. Kneas, '98.
R. W. Knight, '94.
F. H. Knorr, '87.
S. B. Knox, '93.
B. G. Kodjbanoff, '98.
J. deB. Kops, '83.
J. B. Krause, '98.
R. E. Kresge, '96.
W. V. Kulp, '90.
H. M. Kurtz, '90.

L

S. W. Labrot, '92.
D. H. Lackey, '95.
N. Lafon, '78.
P. A. Lambert, '83.
S. E. Lambert, '89.
W. A. Lambert, '95.
O. M. Lance, '72.
H. K. Landis, '90.
C. A. Langdon, '94.
*S. D. Langdon, '87.
F. B. Langston, '84.
W. Langston, '84.
L. E. Lannan, '95.
G. L. de Lara, '86.
R. E. Laramy, '96.
W. A. Lathrop, '75.
F. C. Lauderburn, '91.
E. H. Lawall, '82.
J. P. S. Lawrance, '73.
T. H. Lawrence, '98.
J. W. Ledoux, '87.
L. R. Lee, '97.
H. Lefevre, '92.
H. D. Leopold, '94.
C. McK. Leoser, jr., '91.
T. S. Leoser, '90.
A. E. Lewis. jr., '88.
A. H. Lewis, '95.
G. Lewis, '95.
T. Lewis, '97.
J. J. Lincoln, '89.
G. B. Linderman, '87.
R. P. Linderman, '84.
J. B. Lindsey, jr., '98.
A. E. Lister, '92.
J. E. Litch, '90.
J. E. Little, '94.
C. V. Livingston, '97.
W. J. Lloyd, '92.
J. Lockett, '89.
B. W. Loeb, '95.
F. S. Loeb, '93.
A. Long, '89.
A. F. Loomis, '97.
B. E. Loomis, '96.
C. A. Loomis, '98.
J. T. Loomis, '92.
W. Lord, '96.
T. P. Lovering, '95.
C. A. Luckenbach, '86.
C. O. Luckenbach, '94.
W. A. Lydon, '86.

M

J. B. MacBride, '96.
C. S. MacCalla, '96.
W. H. MacCarthy, '71.
H. D. McCaskey, '93.

* Deceased.

H. H. McClintic, '88.
M. McClung, jr., '94.
J. A. McClurg, '91.
W. A. McFarland, '88.
C. W. Macfarlane, '76.
H. L. McIlvain, '88.
R. A. McKee, '95.
C. L. McKenzie, '93.
F. A. McKenzie, '95.
S. T. McKenzie, '95.
B. MacNutt, '97.
J. D. McPherson, '94.
J. S. Mack, 88.
R. W. Mahon, '76.
J. J. deG. Malcher, '76.
H. L. Manley, '92.
W. P. Marr, '93.
C. D. Marshall, '88.
L. H. Marshall, '98.
J. F. Marsteller, '77.
J. VanS. Martenis, '94.
J. J. Martin, '89.
J. G. Mason, '97.
N. P. Massey, '95.
R. S. Masson, '92.
V. E. Masson, '96.
J. O. Mathewson, '94.
A. S. Maurice, '93.
C. F. Maurice, '95.
G. H. Maurice, '93.
A. E. Meaker, '75.
W. A. Megraw, '97.
H. S. Meily, '87.
E. A. Mercenario, '97.
J. F. Merkle, '84.
F. A. Merrick, '91.
*W. S. Merrill, '94.
T. Merriman, '97.
T. Merritt, '74.
E. J. Millar, '92.
Charles Henry Miller, '88.
*Charles Henry Miller, '89.
Charles Herbert Miller, '90.
E. F. Miller, '83.
E. W. Miller, '96.
G. P. Miller, '88.
J. E. Miller, '93.
J. S. Miller, '95.
J. Z. Miller, '91.
W. H. Miller, '94.
*J. H. Millholland, '88.
P. D. Millholland, '86.
H. S. Miner, '88.
H. B. de Miranda, '73.
R. F. de Miranda, '72.
*S. Miyahara, '77.
C. W. Moffett, '89.
C. A. Moore, '94.
R. de la Mora, '96.
W. F. More, '83.
C. H. Morgan, '96.
*C. F. Moritz, '98.
A. D. Morris, '95.
H. T. Morris, '91.
R. H. Morris, jr., '89.
W. E. Morris, '89.
J. Morrison, '75.
H. S. Morrow, '88.
J. A. Morrow, '87.
J. T. Morrow, '89.
N. Morrow, '83.
R. T. Morrow, '82.
C. T. Mosman, '92.
D. L. Mott, '88.
F. D. Mount, '97.
W. S. Murray, '95.

* Deceased.

W. H. Mussey, '96.
H. K. Myers, '84.
J. H. Myers, '96.
W. F. Mylander, '93.

N

C. P. Nachod, '97.
G. Nauman, jr., '90.
W. L. Neill, '88.
R. Neilson, jr., '95.
H. S. Neiman, '88.
J. L. Neufeld, '94.
C. W. F. Neuffer, '94.
R. E. Neumeyer, '90.
C. A. Newbaker, '94.
H. H. Newton, '97.
D. K. Nicholson, '85.
T. Nicholson, '83.
H. B. C. Nitze, '87.
R. C. Noerr, '97.
B. B. Nostrand, jr., '78.
A. R. Nuncio, '84.

O

J. A. de Obaldia, '98.
A. D. Oberly, '89.
F. Oberly, '96.
R. L. Ogden, '94.
J. F. O'Hearn, '94.
W. R. Okeson, '96.
C. L. Olmsted, '93.
L. A. Olney, '96.
R. B. Olney, '92.
J. M. O'Malley, '89.
C. J. O'Neill, '93.
G. Ordway, '94.
J. O'Reilly, '98.
H. Orth, jr., '92.
N. M. Osborne, jr., '93.
R. E. Ozias, '92.

P

J. W. Packard, '84.
*H. E. Packer, '70.
H. C. Paddock, '98.
*J. H. Paddock, '79.
P. M. Paine, '91.
*H. Palmer, '88.
H. L. Palmer, '96.
M. P. Paret, '78.
C. J. Parker, '88.
C. W. Parkhurst, '93.
D. W. Patterson, '93.
G. S. Patterson, '83.
W. A. Payne, '94.
R. R. Peale, '83.
H. R. Peck, '97.
J. G. Peck, '93.
F. S. Pecke, '75.
J. H. Pennington, '97.
W. C. Perkins, '90.
F. A. Perley, '98.
R. S. Perry, '88.
*F. B. Petersen, '85.
J. G. Petrikin, '96.
G. F. Pettinos, '87.
W. V. Pettit, '94.
J. H. Philips, '95.
A. E. Phillips, '90.
J. Phillips, jr., '95.
R. H. Phillips, '87.
F. W. B. Pile, '88.
C. Platt, '90.
J. S. Polhemus, '72.
R. K. Polk, '87.
C. P. Pollak, '87.

* Deceased.

M. W. Pool, '96.
H. F. J. Porter, '78.
R. H. E. Porter, '89.
H. A. Porterfield, '83.
A. Potter, '90.
G. E. Potter, '80.
S. C. Potts, '94.
J. L. Poultney, '95.
E. W. Pratt, '90.
M. D. Pratt, '87.
H. R. Price, '70.
J. B. Price, '85.
E. J. Prindle, '90.
F. H. Purnell, '83.
M. H. Putnam, '97.

Q

C. W. Quarrier, '98.
E. A. Quier, '91.
H. C. Quigley, '95.

R

F. DeW. Randolph, '92.
R. B. F. Randolph, '93.
W. K. Randolph, '78.
J. L. Rankin, '96.
R. S. Rathbun, '92.
A. G. Rau, '88.
C. R. Rauch, '77.
C. E. Raynor, '88.
R. H. Read, '78.
V. C. Records, '98.
H. B. Reed, '70.
H. P. Reed, '96.
P. L. Reed, '98.
W. M. Rees, '74.
A. K. Reese, '89.
A. S. Reeves, '84.
H. A. Reid, '96.
J. G. Reid, '93.
W. Reinecke, jr., '95.
E. T. Reisler, '87.
H. G. Reist, '86.
W. F. Rench, '91.
J. W. Reno, '83.
E. C. Reynolds, '93.
J. P. Reynolds, jr., '97.
S. A. Rhodes, '92.
W. P. Rice, '76.
F. E. Richards, '93.
G. T. Richards, '87.
H. Richards, '76.
J. W. Richards, '86.
L. W. Richards, '76.
W. P. Richards, '88.
G. M. Richardson, '86.
O. Rickert, '88.
E. Ricksecker, '82.
W. C. Riddick, '90.
B. D. Riegel, '98.
J. I. Riegel, '92.
J. S. Riegel, '90.
S. S. Riegel, '97.
E. J. Rights, '95.
H. T. Rights, '95.
G. W. Ritchey, '93.
S. N. Riter, '95.
M. Rock, '69.
T. C. Roderick, '94.
A. L. Rogers, '89.
C. L. Rogers, '83.
F. W. Roller, '94.
C. E. Ronaldson, '69.
*W. D. Ronaldson, '70.
D'A. W. Roper, '98.
*A. S. Ross, '86.

* Deceased.

E. P. Roundey, '97.
H. W. Rowley, '85.
W. Royce, '97.
*G. A. Ruddle, '86.
J. Ruddle, '83.
J. D. Ruff, '82.
G. H. Ruggles, '96.
C. B. Rutter, '94.
C. C. Rutter, '96.

S

F. B. Sage, '93.
A. L. Saltzman, '97.
J. E. Sanborn, '90.
R. F. Sanchez, '98.
C. F. Sanders, '97.
F. W. Sargent, '79.
W. R. Sattler, '88.
*M. L. Saulsbury, '93.
W. H. Sayre, jr., '86.
J. A. Schloss, '93.
R. Schmitz, '91.
E. A. Schnabel, '91.
A. Schneider, '92.
H. Schneider, '94.
B. F. Schomberg, '94.
A. Schotte, '93.
C. W. Schwartz, jr., '89.
H. C. Schwecke, '98.
E. Schwinghammer, '95.
C. F. Scott, '97.
H. D. Scudder, '72.
W. McI. Scudder, '73.
*.J. W. Scull, '87.
H. H. Seabrook, '97.
B. Searle, '84.
H. K. Seltzer, '95.
W. F. Semper, '93.
J. B. Semple, '92.
L. B. Semple, '84.
S. P. Senior, '97.
A. H. Serrell, '97.
J. C. Sesser, '96.
E. E. Seyfert, '94.
W. Shapleigh, '71.
A. B. Sharp, '93.
F. B. Sheaffer, '97.
C. K. Shelby, '92.
L. R. Shellenberger, '91.
*A. Y. Shepherd, '96.
G. E. Shepherd, '94.
D. F. B. Shepp, '98.
J. L. Sheppard, jr., '97.
H. J. Sherman, '90.
J. E. Shero, '95.
I. A. Shimer, '91.
C. E. Shipley, '94.
E. H. Shipman, '88.
W. C. Shoemaker, '90.
L. D. Showalter, '96.
H. Shriver, jr., '96.
J. C. Shriver, '92.
E. P. Shuman, '97.
*S. B. Sickler, '82.
J. S. Siebert, '86.
R. S. Siegel, '95.
E. H. Sigison, '95.
J. B. Slack, '95.
J. E. Slade, '97.
A. P. Smith, '84.
*E. O. Smith, '85.
F. B. Smith, '97.
F. S. Smith, '87.
N. W. Smith, '93.
P. H. W. Smith, '92.
R. E. Smith, '94.

* Deceased.

B. R. Smoot, '98.
A. M. Smyth, '89.
E. E. Snyder, '87.
M. D. Sohon, '90.
E. A. Soleliac, '93.
F. P. Spalding, '80.
J. H. Spengler, '86.
H. W. Sprague, '97.
M. T. Stack, '97.
E. S. Stackhouse, '86.
L. C. Starkey, '98.
J. W. Stauffer, '98.
E. G. Steinmetz, '95.
G. Stern, '93.
A. R. Sterner, '97.
T. Stevens, '86.
W. Alonzo Stevenson, '88.
W. Alston Stevenson, '90.
J. Stewart, jr., '97.
M. Stewart, '84.
H. T. Stilson, '91.
W. R. Stinemetz, '93.
C. H. Stinson, '83.
*R. Stinson, '83.
J. E. Stocker, '95.
A. W. Stockett, '89.
M. S. Stockett, '98.
L. Stockton, '81.
H. H. Stoek, '87.
W. H. Stokes, '88.
H. E. Stout, '86.
R. P. Stout, '91.
H. R. Stratford, '94.
P. B. Straub, '97.
T. A. Straub, '90.
*J. K. Surls, '86.
W. C. Swartz, '94.
F. G. Sykes, '94.

* Deceased.

E. H. Symington, '98.
T. H. Symington, '93.

T

J. E. Talmage, '91.
R. M. Tarleton, '95.
C. L. Taylor, '76.
E. S. Taylor, '96.
J. Taylor, '93.
L. C. Taylor, '89.
R. S. Taylor, '95.
W. B. Taylor, '96.
W. P. Taylor, '86.
*O. O. Terrell, '87.
T. C. Thomas, '97.
J. M. Thome, '70.
C. H. Thompson, '94.
F. duP. Thomson, '90.
J. A. Thomson, '96.
A. T. Throop, '89.
N. Thurlow, '95.
E. C. Thurston, '96.
J. W. Thurston, '96.
C. M. Tolman, '85.
C. C. Tomkinson, '90.
W. S. Topping, '91.
H. Toulmin, '86.
P. Toulmin, '86.
C. F. Townsend, '95.
J. B. Townsend, '95.
C. E. Trafton, '96.
L. B. Treharne, '80.
W. Treichler, '97.
H. C. Tripp, '96.
P. H. Trout, '94.
L. E. Troutman, '93.
O. W. Trueworthy, '94.
R. H. Tucker, '79.

Charles P. Turner, '89.
Clarence P. Turner, '94.
Claude A. P. Turner, '90.

U

C. W. Underwood, '94.
W. E. Underwood, '97.
D. A. Usina, '91.
M. N. Usina, '92.

V

J. F. VanBenthem van den Bergh, '95.
A. H. Van Cleve, '90.
E. Vander Horst, '89.
H. R. Van Duyne, '97.
B. R. Van Kirk, '80.
E. P. Van Kirk, '87.
W. R. Van Liew, '95.
C. H. Vansant, '95.
C. H. Veeder, '86.
J. R. Villalon y Sanchez, '90.
J. D. Von Maur, '94.

W

J. R. Wagner, '85.
C. P. Wagoner, '97.
C. Walker, '89.
L. W. Walker, '92.
R. W. Walker, '84.
J. S. Wallace, '96.
U. G. S. Walters, '96.
E. H. Waring, '98.
F. C. Warman, '93.
E. O. Warner, '94.
W. Warr, '95.
C. B. Warren, '98.
R. C. Warriner, '94.
S. D. Warriner, '90.
J. A. Watson, '84.
L. Watts, jr., '98.
H. S. Webb, '98.
*C. G. Weaver, '71.
W. M. Webb, '88.
C. E. Webster, jr., '98.
H. D. Webster, '96.
J. E. Weideman, '97.
F. A. Weihe, '89.
F. T. Weiler, '96.
W. E. Weimer, '89.
J. H. Wells, '85.
G. E. Wendle, '91.
H. M. Wetzel, '88.
A. Weymouth, '94.
F. I. Wheeler, '95.
G. C. White, '97.
H. A. White, '95.
C. Whitehead, '85.
J. C. Whitmoyer, '95.
A. J. Wiechardt, '87.
E. N. Wigfall, '95.
H. A. J. Wilkens, '87.
D. S. Williams, '96.
D. T. Williams, '90.
E. H. Williams, '75.
F. Williams, '87.
D. W. Wilson, jr., '96
H. C. Wilson, '78.
J. R. Wilson, '96.
J. M. Wilson, '95.
T. W. Wilson, '94.
W. L. Wilson, '88.
P. B. Winfree, '91.
E. B. Wiseman, '88.
D. H. Witmer, '92.
N. J. Witmer, '87.

* Deceased.

F. Wittman, '92.
M. Wittmer, '82.
L. T. Wolle, '77.
C. O. Wood, '92.
H. L. Wood, '95.
T. B. Wood, '98.
H. R. Woodall, '89.
B. E. Woodcock, '92.
L. Wooden, '98.
W. B. Wooden, '94.
*H. Woods, '87.
*F. C. Wooten, '80.
A. M. Worstall, '96.
W. Worthington, '98.
E. A. Wright, '89.
H. Wright, '90.
J. B. Wright, '89.

* Deceased.

Y

S. Yamaguchi, '88.
G. L. Yates, '97.
*R. B. Yates, '70.
C. Yglesias, '95.
A. E. Yohn, '97.
S. A. Yorks, jr., '98.
G. F. Yost, '87.
F. S. Young, '97.

Z

C. F. Zimmele, '87.
H. B. Zimmele, '98.
H. S. Zimmerman, '98.
*C. F. Zogbaum, '75.
L. R. Zollinger, '88.

CONTENTS.

Almanac.

Calendar, 3.

Board of Trustees, 4.
- Honorary Trustees, 4.
- Honorary Alumni Trustees, 5.
- Officers of the Board, 5.
- Executive Committee, 5.
- Building Committee, 6.
- Comm. on College Administration, 6.

Faculty, 7.
- President and Professors, 7.
- Lecturers, 9.
- Instructors, 9.
- Packer Memorial Church, 11.
- Gymnasium Service, 11.
- Library Service, 11.

Origin and Design of the University, 12.

Tuition, 12.

Public Worship, 13.

Site, 14.

Buildings, 14.
- Packer Hall, 14.
- The Chemical Laboratory, 15.
- The Metallurgical Laboratory, 16.
- The Physical Laboratory, 16.
- Saucon Hall, 17.
- The Sayre Observatory, 17.
- The Packer Memorial Church, 17.
- The University Library, 17.
- The Gymnasium, 18.

Expenses of Students, 18.

Admission of Students, 19.
- Date of Examinations, 19.
- Character of Examinations, 20.
- Requirements for Admission, 20.
- Conditional Admission, 27.
- Special Students, 28.
- Admission to Advanced Standing, 28.
- Admission to Graduate Courses, 28.
- Preparatory School Certificates, 28.

Program of Studies, 29.
- The School of General Literature, 29.
  - The Classical Course, 40.
  - The Latin-Scientific Course, 42.
  - The Course in Science and Letters, 43.
- The School of Technology, 46.
  - The Course in Civil Eng., 46.
  - The Course in Mech. Eng., 51.
  - The Courses in Mining Eng., 59.
  - The Course in Metallurgy, 64.
  - The Course in Elect. Eng., 73.
  - The Course in Chemistry, 77.

Physical Culture, 85.

Graduating Theses, 85.

Diplomas and Certificates, 86.

Graduate Students, 86.

Graduate Degrees:
- Requirements for M.A., 86.
- Requirements for M.S., 86.

The University Library, 87.
- The Coxe Memorial Library, 88.

The Observatory, 89.

The University Museum, 89.

Summer School of Surveying, 90.

University Lectures, 90.

Students' Societies, 91.

Founder's Day, 93.

The University Sermon, 93.

Theses presented by candidates for degrees in 1898, 94.

University Day, 99.
- Exercises of June 15, 1898, 99.
- Award of Wilbur Scholarship, 100.
- Award of the Wilbur and Price Prizes, 100.
- Degrees Conferred, 101.

The Wilbur Scholarship, 101.

The Alumni Scholarship Fund, 101.

The Henry S. Haines Memorial Scholarship, 102.

The Mercur Memorial Fund Scholarships, 102.

The Coxe Memorial Fund, 102.

The Wilbur Prizes, 102.

The Price Prize in English, 102.

The Alumni Prizes in Oratory, 103.

Examination Papers, 105.

Catalogue of Students, 120.
- Graduate Students, 120.
- Senior Class, 121.
- Junior Class, 122.
- Sophomore Class, 125.
- Freshman Class, 127.
- Special Students, 129.

Summaries of Students:
- By States, 130.
- By Classes and Courses, 132.

List of Alumni, by classes, 133.

Officers of Alumni Asscoiation, 204.

List of Alumni, alphabetical, 205.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 111997836